

SECRET

GOVERNMENT OF PUNJAB

REPORT

OF

**The Bhakra-Nangal High Powered Commity
(1956-57)**

October 31, 1957



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सुलभाः पुरुषा राजन्सततं प्रियवादिनः ।
अप्रियस्य च पथ्यस्य वक्ता श्रोता च दुर्लभः ॥

Easy to find, O King ! are the men that always speak the words that please. Difficult to find are the men, both those that hear and those that speak (gently), the words that are not pleasant but wholesome.



—Ramayana, VI, xvi. 21

CHAPTER I

INTRODUCTORY

1.1. The Public Accounts Committee of the Punjab Vidhan Sabha, in their third report while dealing with the accounts of the Bhakra-Nangal Project, observed :—

Genesis of the Committee

“ For the reasons we have stated above, we are led to the conclusion that proper precautions in expending public money were not taken. Consequently, there has been a loss to the State Exchequer. We, therefore, feel that an independent enquiry into the overall working of the Bhakra Canals Administration and the Project Administration is not only desirable, but, in our view, an indispensable necessity and we recommend accordingly. ”

1.2. This was in October, 1954. In their fourth report in March, 1956, they had occasion to refer the same matter again and said :—

“ We had expressed dissatisfaction and some measure of concern over the deplorable state of affairs prevailing in the execution of the Project and we had recommended in no ambiguous terms the appointment of a High Powered Committee to probe into the working of the Project. More than a year has elapsed since then and we report with regret that we have not so far been informed of any tangible, concrete action that may have been taken by the Government in this behalf. ”

1.3. On the 1st April, 1956, the Irrigation and Power Minister announced Government's decision to appoint a Committee to enquire in the working of the Bhakra Canals Administration and in their communication dated the 11th May, 1956, the present Committee consisting of—

Appointment of the Committee and Terms of reference

Justice S. S. Dulat, Judge of the Punjab High Court,—*Chairman*

Shri P. C. Agrawal, Retired Chief Engineer, Uttar Pradesh,—*Member*

Shri Dildar Husain, Retired Chief Engineer, Hyderabad,—*Member*

was appointed with the following terms of reference :—

(1) To inspect representative sections selected by the Committee along the Nangal Hydel Channel and the Bhakra Canals and after scrutinising the relevant accounts to estimate the order of excess expenditure on those canals that may be attributable to malpractices, inefficiency or neglect. While estimating the excess expenditure, the Committee will, in particular, take into consideration the following among other factors :—

- (a) Whether the quantities of work paid for, are in excess of work actually executed ;
- (b) Whether the quality of the work done was according to the specifications and, if not, whether the payment took into account the variations in the quality of the work done ;
- (c) Whether the overall rates paid are in excess of rates that may be regarded as reasonable, having regard to local conditions ;
- (d) Whether there has been a significant misclassification in the type of excavation ;

- (e) Whether the rules of inviting tenders of allotment of work and sanction of rates have been generally followed ;
- (f) Whether stores were purchased in excess of reasonable requirements and the rates paid were higher than necessary ; and
- (2) To recommend ways and means of preventing a recurrence of malpractices that may come to notice.

The Committee had for its Secretary, Shri Raghavachari, an officer of the rank of Superintending Engineer, loaned by the Central Water and Power Commission.

1.4. We were able to assemble at Chandigarh for the first time on the 14th May, 1956, and with the help of our Secretary started collecting the Preliminary work. required staff. In the first instance, only the Secretary, an Accounts Officer and three Stenographers were sanctioned, but it was apparent that much more staff was required and although we had no difficulty in persuading Government to sanction the necessary posts, there was considerable difficulty in obtaining the required personnel and it took nearly three months before some of the technical and accounts staff were able to join us. In the meantime, we held a general discussion with the Chief Engineers and then started a tour of the canals to acquaint ourselves with the problems facing us. At Nangal we had discussions with the Chief Accounts Officer and the Resident Audit Officer to ascertain the pattern of accounting irregularities. We then paid a visit to the Irrigation Secretariat at Simla to pick up the relevant files out of a mass of official record and to study the system of work obtaining in the Department. We later inspected the Bhakra Main Line from Rupar to Tohana where the large irrigation system starts. After some preliminary discussion at Hissar with the Assistant Accounts Officer and the officers of the Irrigation Department, we moved on to Delhi where we held discussion with the Chairman of the Committee of Engineers set up to revise the Schedule of Rates. Thus, by the end of June, 1956, we had a fairly clear idea of the task before us and we framed a preliminary questionnaire for the Chief Engineers and the Superintending Engineers.

1.5. We had by this time come up against two difficulties. The first was mechanical, consisting of the incomplete state of accounts in every Collection of data. circle. Many of the documents which should have been prepared as the works proceeded, had not, in fact, been prepared and were at the time of our inspection being compiled and not always compiled satisfactorily. Some of the documents prepared after such a long period of time, were not readily comprehensible. It was, therefore, clear to us that in order to ascertain the precise facts we had to go to the preliminary records contained in the measurement books and the contractors' bills involving necessarily a good deal of more time than we had at first expected. The second difficulty was psychological. We found in the course of our discussions that many of the engineers were constantly on the defensive. We must add at once that apart from this psychological barrier which took some time to break down, we found abundant co-operation on the part of the Chief Engineers and the officers working under them.

1.6. We also had whole-hearted co-operation from the Chief Accounts Officer and his assistants. We have referred to the delay that occurred in obtaining the technical staff which might well have delayed the completion of our investigation, but due to the courtesy of the Chief Engineers and the ready willingness of local officers we were able to obtain assistance during the whole time we were ourselves short-staffed. The officers of the Anti-Corruption Department also rendered considerable help.

1.7. While waiting for the replies to our questionnaire, we devised a number of forms for the collection of information from the Divisional Officers and then started a series of on-the-spot investigations.

1.8. Government had, in the first instance, appointed the Committee for a period of six months. This was, however, found to be too short and we, therefore, decided to ask for an extension. We had, at that stage, planned to complete our investigation by the end of the year 1956, and to finalise our report by the end of January, 1957, thus requiring only 2½ months' extension. We found, however, that during that time, we were able to cover only a portion of the ground. We were required by the terms of our reference to inspect representative sections along the Nangal Hydel Channel and the Bhakra Canals and as a result of the examination of the relevant accounts to estimate the order of excess expenditure on those canals. This involved a generalisation accompanied necessarily by the risk involved in any such generalisation and since we had only been able to examine a small portion of the entire work by then, the risk was considerable. At the same time, we felt that in the beginning, the more serious errors were coming to our notice and a picture of the Project was emerging which was more distressing than our own overall view of the project seemed to warrant. We also found that some important witnesses were not willing to appear before us and we had at that stage no power to compel their attendance. In the meantime, Government had referred to us for our opinion some specific cases of suspected corruption outside the precise terms of our reference and these cases demanded detailed examination. In these circumstances, Government agreed to a substantial extension of the period at our disposal to the end of October, 1957, and also conferred on the Committee powers of a Civil Court to compel the attendance of witnesses.

Period of Enquiry and Conferment of powers of a Commission.

1.9. We have now seen nearly the entire canal system in the Punjab and held discussions with all the Chief Engineers, past and present, who happened to be connected with the Project, nearly all the Superintending Engineers in the Irrigation Department and such of the Executive Engineers and Sub-Divisional Officers who were concerned with the execution of the works. We have also conducted a large number of field studies and got samples of soil, mortar, etc., analysed in the laboratories. We also had the benefit of discussing our problems with Dr. A. N. Khosla, Vice-Chancellor, Roorkee University, and Shri Kanwar Sain, Chairman, Central Water and Power Commission, and also Chaudhary Lahri Singh, Irrigation and Power Minister, till 1955. We have examined in all 81 witnesses whose list is attached in Appendix II. We have, with the help of our staff, analysed a large number of estimates and examined the details of expenditure connected with those estimates [*vide* Annexures (1) and (2), Appendix I]. We have placed the result of those examinations before the officers concerned in the execution of works and obtained their explanations and only arrived at our final conclusions in the light of those explanations. We now feel satisfied that we have obtained a comprehensive view of the project and all its salient details. While estimating the reasonable cost we have attempted to avoid adopting any ideal standards and have on the other hand, as far as possible, adopted the standards prevailing in the set-up in which the engineers actually worked. For our recommendations, however, we have ventured to look beyond the present set-up.

Discussions and visits.



सत्यमेव जयते

*To hand on the treasure, not diminished ; but increased,
is our supreme duty to posterity.*

—BERTRAND RUSSELL
(*Human Society in Ethics and Politics.*)





सत्यमेव जयते

CHAPTER II

THE PROJECT—BRIEF HISTORY AND DESCRIPTION

2.1. The Bhakra-Nangal Project is the biggest yet undertaken in India. It involves at one end the building of a dam 740 feet high—the highest in the world—and at the other end the excavation of a network of irrigation channels, approximately 2,790 miles in length to irrigate over 3.6 million acres of land, and in between, the construction of four power-houses capable of generating about one million Kwts. of electric power. The dam is being constructed with the help of the most up-to-date machinery imported from abroad and worked by highly trained technicians, many of whom have come from the United States of America. The irrigation channels, on the other hand, have been mostly built by masses of unskilled labourers working with bare hands and using age-old implements. The designs and drawings for the two power-houses that have so far been built came from America, but the innumerable problems that arose during their construction were solved on the spot by Punjab Engineers. Apart from the generation of power, the main purpose of the Project is to take the flood waters of the Sutlej to the desert areas of Hissar and its neighbourhood and by providing irrigation there, to break the age-old tragic association between Hissar and Famine.

The scope of the project.

2.2. Hissar is a southern district of the Punjab and right on its border starts the great Indian Desert of Rajasthan. This tract is inhospitable ; rainfall is scanty ; sub-soil water level extremely low, making well irrigation impossible ; years of drought have been regular and frequent, and agriculture, therefore, a precarious industry. The proximity of this tract to Delhi did from time to time attract the attention of the rulers, some of whom, like Ferozeshah Tuglaq and Akbar, did make attempts to provide water for this tract, but due to the slender resources at their disposal, those attempts did not prove fruitful. Methodical irrigation started in a portion of the Hissar District from the Western Jumna Canal, but the area involved was a tiny portion of the whole. In the middle of the last century, the British Government was pressed by some courageous advocates to adopt the wise policy of providing river waters to such areas where it was most needed, but when the practical task of building canals started, this policy was abandoned and it seems to have been decided to utilise the river water through the cheapest possible canals and in areas where it could be most profitably sold, and in the result this arid tract, which is two hundred miles from the nearest supply, remained neglected.

Hissar—Dust Bowl of Punjab.

2.3. The history of the conception of the present project goes back nearly half a century when the possibility of storing the flood waters of the Sutlej was conceived and the first practical shape to this conception was given in a directive issued by a gifted Lt. Governor of the Punjab (Sir Louis Dane) who decided in 1908 to have the feasibility of a storage dam in the vicinity of Bhakra, investigated. From that time onwards, the conception remained alive and a Project was actually prepared by the Punjab Irrigation Department in 1919, proposing a Dam 390 feet high, the remodelling of the existing Sirhind Canal and the construction of a new canal with Headworks at Aliwal. This project was, however, not executed probably because of the cost involved and preference was given to what came to be known as the Sutlej Valley Project. A second project was prepared in 1932 and yet another during 1939 to 1942, which was further revised in 1944 and then in 1946. Work on the basis of the last revised project actually started in 1946, but it was only after the Partition and in changed conditions that Government became alive to the urgent necessity of carrying through the Project and the first detailed report in respect of the Project as it now stands was framed in 1949-50.

History of the Project.

2.4. At the Head of this Project stands the high Dam at Bhakra where the Sutlej runs through a narrow gorge, making it possible to build a reservoir with a storage capacity of 7.4 million acre feet of water. Eight miles below Bhakra is built a barrage called the Nangal Dam to divert the river water into the Nangal Hydel Channel.

Description of the Project.

This is a power channel, forty miles long, with a capacity of 14,500 cusecs at its head and of this, a supply of 12,500 cusecs passes into the Bhakra Main Line. On the Hydel Channel are located two Power-houses, the first at Ganguwal (R.D. 58,000), where the canal is made to drop 93 feet, and the second at Kotla, a few miles below Ganguwal where again there is a similar fall. Each of these Power-houses has a generating capacity of 72,000 Kwts.

2.5. The irrigation system starts with the Bhakra Main Line, which has a discharge of 12,433 cusecs. This canal is 108 miles long and ends at Tohana. On the way, apart from a few small channels, a big branch, called the Narwana Branch, takes off to the left carrying 4,500 cusecs. At Tohana the main canal branches into two main branches, the Bhakra Main Branch—90 miles long with a discharge of 5,055 cusecs at its head and 1,909 cusecs at the tail, where it feeds two distributaries for irrigating areas of Rajasthan, and the Fatehabad Branch, 60 miles long, with a discharge of 1,634 cusecs at its head. From the Bhakra Main Branch before it reaches the tail, take off two other branches, the Ratia Branch with a capacity of 678 cusecs and the Rohri Branch with a capacity of 1,024 cusecs, and there are, of course, the distributary systems taking off these branches. Out of these canals, the Nangal Hydel Channel, the whole of the Bhakra Main Line, the whole of the Narwana Branch and the entire length of the Bhakra Main Branch, are lined. The Fatehabad Branch is an unlined channel and so are the distributaries.

2.6. Large-scale irrigation thus starts more than two hundred miles below the main reservoir at Bhakra. The Narwana Branch, out of which some small irrigation channels take off on the way, is really a feeder for the Sirsa Branch of the Western Jumna Canal, the idea being to supply the Sutlej water to the Sirsa Branch and thereby release the Jumna water feeding the Sirsa Branch, for irrigation elsewhere.

2.7. Apart from the canal system above described, the headworks of the old Sirhind Canal at Rupar have been remodelled, raising the capacity of that canal from 9,040 to 12,000 cusecs, of course, by remodelling the Sirhind Canal. Further a new canal called the Bist Doab Canal, having a head discharge of 1,601 cusecs, takes off the right bank of the Sutlej at Rupar Weir to irrigate the areas of Jullundur and Hoshiarpur districts.

2.8. The canal system beginning at Nangal was formally opened by the Prime Minister of India on the 8th July, 1954. Ever since then, the

Completion of canal system.

Nangal Hydel Channel has run every day and other canals down below every flood season providing kharif irrigation for thousands of acres of land. The effect of this even limited irrigation is visible and we have, while travelling, observed the changing face of the land which the arrival of water has made possible. What is not so visible though equally valuable is the experience that has come out—is yet coming out—of the execution of this huge undertaking. Thousands of workmen have, of course, toiled day and night at this job and to co-ordinate their exertions, hundreds of engineers, young and old, have ceaselessly worked planning, designing and executing the various works. The professional experience thus gained is a solid asset to the country and we have no doubt that long after Bhakra has become past history, the imprint that it will leave on the minds of the young engineers will be reflected in several other projects, yet to come.

During the earlier years of construction, success frequently depended on one's ability to drive men, mules and equipment in order to maintain a progress schedule . . . today such practices have been replaced to a large degree by carefully Planning each step for a Project before construction is started and by maintaining adequate controls.

—R. L. PEURIFOY

*(Construction, Planning,
Equipment and Methods.)*



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CHAPTER III

THE PROJECT ORGANISATION

3.1. The task of executing this vast project was entrusted to the Punjab Irrigation Department. It had considerable previous experience of irrigation works. Founded by the Royal Engineers of the British Army about the middle of the last century, it had gradually accumulated valuable experience and built up a fine tradition of hard work. During the period of about thirty years preceding the Partition, it had successfully completed large works on the Sutlej Valley Project, the Thal Project and the Haveli Project, and had thus gained a good deal of confidence to execute new works. The Bhakra-Nangal Project, however, posed certain new problems, the precise implications of which, we feel, were not at once apprehended and which were not readily amenable to conventional methods. The size alone of the Project was colossal and its orderly handling needed careful planning of details. In part, the type of work was new. The Nangal Barrage, the Nangal Hydel Channel, and the two power-houses, based on it threw up practical difficulties in construction which were not easy to anticipate. We too fully appreciate the kind of strain that the size and the nature of the project imposed on the organisation. It is necessary to understand what the organisation is and how it works.

3.2. At the head of the Irrigation Department stand the Chief Engineers exercising full technical control over all works. There are three of them at present, apart from the General Manager, Bhakra Dam.

Under the Chief Engineers are Superintending Engineers in charge of different circles and as the Public Works Department Code says:—

“The Circle is administrative unit of the Department”.

3.3. There is a separate centralised Designs Office in charge of an officer of the rank of Superintending Engineer and it is responsible for working out designs for all works on a new project. There is also the Irrigation and Power Research Institute in charge of an officer of a similar rank which is continuously engaged in the task of scientific research concerning irrigation works.

3.4. Under the Superintending Engineers are Executive Engineers in charge of Divisions and they form the executive unit of the department. The Divisions are then divided into Sub-Divisions in charge of Sub-Divisional Officers. In each Sub-Division, work a number of overseers to assist the Sub-Divisional Officer. The pattern thus is similar to that of the General Administration in the State and as in the case of General Administration the pivot of the organisation is the Executive Engineer corresponding to the District Officer. Young Engineers newly recruited are, after a period of training, placed in charge of a Sub-Division and it is at this level mostly that they gain practical experience of construction work and their subsequent efficiency as Executive Engineer depends on the quantum and the kind of experience they gain. The departmental rules, therefore, generally lay down a minimum period of service as Sub-Divisional Officer before promotion to the rank of the Executive Engineer. During the present project, however, there was such shortage of engineering personnel that this rule of minimum qualifying service had to be repeatedly relaxed and even then the situation could not be met. To quote the Chief Engineer's evidence before us:—

“It may also be stated that in view of the extraordinary shortage, the demand could not be met in spite of reduction in the length of qualifying service and we had to reduce even our standards of fitness for promotion”.

3.5. The lowest paid technical officer in the department is the overseer, but it is on his shoulders that the responsibility for preparing the most important initial record rests and any inaccuracy in that work due to inefficiency, or dishonesty, will frequently lead to endless difficulty. The method of work obtaining in the department is such that it keeps the overseer constantly busy and when the speed of construction increase beyond a certain point, it becomes extremely difficult for the overseer to keep abreast of his work. In the case of the present project, the speed of construction at times was stupendous

Overseer—the beast of burden.

3.6. We have briefly described the normal set up of the Irrigation Department. In respect of the present project, an innovation was introduced in 1950 by the setting up of the Bhakra Control Board. This happened because there were two other States, Pepsu as it then was and Rajasthan, that were interested in the project as both were to receive the benefits of irrigation. With the object of enabling these States to have a voice in the general direction of the Project and to co-ordinate the activities of the States, a Board—Bhakra Control Board—was constituted by a resolution of the Government of India in September, 1950, and given overall financial and technical control. It was a non-statutory body and on it were represented the Central Government, as well as the participating States. The Chairman was the then Governor of the Punjab in his personal capacity and the Members were as follows:—

Bhakra Control Board.

- (1) Shri C.M. Trivedi .. Chairman
- (2) Shri A.N. Khosla, Consulting Engineer to the Government of India for Water, Power Irrigation, Navigation .. Vice Chairman
- (3) Shri S. Ratnam, Joint Secretary to the Government of India, Ministry of Finance .. Member
- (4) Shri Sarup Singh, Chief Engineer and Secretary, Bhakra Dam .. Member
- (5) Shri K.S. Malhotra, Secretary to Government, Punjab, Finance Department .. Member
- (6) One representative of Pepsu and Rajasthan nominated by the Ministry of States.

There were subsequent changes in the membership of the Board and its functioning shows that as a rule all the Chief Engineers concerned with the execution of the project were invited to attend its meetings. The Board was to exercise control over the project, but as was inevitable it had to depend mainly on the information and advice tendered by various Chief Engineers and the setting up of the Board did not imply any change in the organisation of the Irrigation Department and that department remained as before responsible for detailed execution. The Board has a whole-time Secretary of the rank of the Superintending Engineer.

3.7. The Irrigation Department virtually executes its works departmentally and although it employs contractors, these persons are merely suppliers of labour and not contractors to execute specified works in the ordinary sense. What happens is this. The department decides that a certain channel is to be built, or a certain cross-drainage work constructed. A detailed estimate is prepared and the probable cost worked out. The contractor is then merely asked to furnish skilled and unskilled workmen for the job and these workmen carry out the work under the directions of the departmental officers. The contractor is paid the cost of labour which

Method and agency of execution.

is computed with the help of quantities of work executed. Ordinary tools and implements are provided by the contractor for his workmen but special tools and plants and a number of other facilities are supplied by the department. When the cost of the whole work is calculated, it includes the cost of labour, for which the contractor is separately paid and of course, the cost of the material, supplied by the department. This material is obtained from various sources ; sometime through a contractor and quite often that contractor is other than the one, who supplies labour, and even for the supply of material the department sometimes employs one person for making the material available and another for carrying. We are mentioning these details to make it clear that an overseer in the Irrigation Department is not merely concerned with measuring a finished work while it is being executed or when it is ready, but is constantly engaged in measuring various quantities in various forms.

3.8. The form of contract in which the department enters with the contractor is a little different from ordinary contracts prevailing in other branches of the Public Works Department. It is described as the 'Work Order System' and the essence of it is that the department undertakes to pay the contractor a certain rate for a certain item of work done by him without any stipulation as to the quantity or the period of time in which it is to be executed. When a channel is being excavated, for instance, the department offers to pay the contractor certain rate for the earthwork, he might choose to do and the contractor is as free to leave the work at any stage he likes, as the department is to turn him out at any time. We do not intend at this stage to enter into the merits and demerits of this system which has prevailed in the Irrigation Branch for a long time. We are merely recording the fact that under this system the contractor is under no obligation to complete any work within any specified time. The department, no doubt sees to it that the work proceeds expeditiously and the option it has of throwing out a lazy contractor ensures that end. The overall picture, however, is that when a project is under way, a large number of small contractors are employed to do a large number of jobs scattered over a large area and the overseers are constantly busy measuring quantities and preparing bills for numerous items. Constant supervision over their work is absolutely essential. We shall presently see that supervision to that extent was hardly possible in the circumstances in which the present project was carried through.

3.9. We can now turn to the controls provided by the departmental rules to see how far they continued to function. Before any work starts

Rules of Procedure in execution.

in any part of the project it is necessary, according to the departmental rules, that a detailed estimate based on accurate field data be prepared and sanctioned by a competent authority. This provides an occasion to the Executive Officer to consider all details of the work so that every possible economy may be effected. The sanctioned estimate is thus a guide to the field officer and any tendency to overspend is curbed. The rules require that as soon as the likelihood of any excess in expenditure becomes apparent, prompt information about it must be sent to the Administrative officer and as soon as practicable, a revised estimate must be prepared. This affords a second opportunity to consider the cost of each part of the work. It is obvious that if the preparation of the detailed estimate and the timely revision of it are considered to be matters of form, the check provided by the rules ceases to function. In the case of the present project, we find that a large number of works were started before any detailed estimate was sanctioned and in many cases the detailed estimates were themselves extremely sketchy and obviously prepared merely to obtain formal authority for going on with the work. More serious is the fact that revised estimates were seldom prepared in good time. The Chief Accounts Officer has furnished us with figures which indicate that even at the time of the writing of this report, actually expenditure of the order of Rs 2.73 crores incurred in excess of proper sanctions still remains to be regularized.

3.10. This practice of not preparing revised estimates has been in some cases wholesale, like the earthwork on the Bhakra Main Line and the Narwana Branch, where excesses have occurred over estimates and not a single revised estimate has been prepared or at any rate sanctioned. Shri R.R. Handa narrated to us an incident concerning his early career in the Irrigation Branch when as Sub-Divisional Officer, he happened to exceed an estimate by a thousand rupees and was so mindful of it that he did not put it up to his superior officer until he had humoured him by bringing to his notice a number of savings on other estimates. In the present project, however, excesses amounting to several lacs of rupees actually occurred and nobody had the inclination to worry over them. Extreme caution with which these matters were viewed thirty years ago had completely disappeared and excesses were treated as inevitable and in several cases no attempt was made to justify them. We can attribute this attitude only to laxity of administrative control from above.

3.11. The real and effective control over expenditure is exercised by the Divisional Officer or the Executive Engineer and he does it by constantly watching the actual expenditure on a particular work and comparing it with the estimated expenditure. The effectiveness of this control depends on the prompt compilation of the relevant accounts in the division which compilation in turn depends on the accurate and timely preparation of the initial records in the Sub-Division. In respect of the present project, we have found that important primary records like the register of works, the material at site accounts, were frequently not prepared at all and the result is that the compilation of accounts has not been complete and huge staff has had to be sanctioned for clearing up arrears in accounts. A part of the trouble is due to the insufficiency of staff as compared to the speed of work, but a part of it, at any rate, is clearly attributable to the unfortunate attitude of the executive staff in not attaching sufficient importance to this part of the work. Some of the engineers have looked at this matter of compiling the accounts as a necessary evil and therefore, to be postponed as long as possible. When we discussed this matter with Shri R.R. Handa, who was the Chief Engineer, Bhakra Canals, at the most important time, we got the impression that he too thought that the engineers were mainly concerned with constructing the works and the question of rendering an account of the expenditure incurred was of a secondary importance which could be postponed to a leisurely period when the work on the project has been actually completed. This view is somewhat unfortunate, because experience shows again and again that if accounts are not prepared and compiled at the time that expenditure is being incurred, it becomes extremely difficult to compile them later.

3.12. For the first time in the case of the present project a system for cent per cent concurrent audit had been set up and it was hoped that with the help of this fairly expensive organisation leakages in expenditure would be plugged in good time. Actually, however, this scrutiny of each item of expenditure could be useful only if the accounts themselves were maintained with reasonable despatch. When the accounts themselves were in a continuous muddle, the cent per cent audit merely helped to bring to light a much large number of irregularities than had been unearthed on previous occasions by Statutory Audit and thus the number of audit objections grew in volume. We are aware that certain improvements were made at irregular intervals but there is little doubt in our mind that full advantage of the thorough audit that had been set up, was not taken by the engineers. The delay in compiling the accounts and the disorder in which important records were maintained has been one of the major causes leading to excessive expenditure on several occasions.

3.13. One major cause which led to the breakdown of various controls to which we have referred, can be described as lack of adequate planning.

Inadequate Planning of Project.

We are aware that during the first two or three years, proper planning was made extremely difficult by the uncertainty regarding funds as the Government of India, who were financing the project in the form of loan, were not in a position to state definitely what amount of money would be available during any one year. Quite naturally, therefore, construction programmes had to be prepared in the alternative and priorities had to be frequently shifted. We are also aware that some of the work was of a kind which had not previously been handled and also that some planning which depended on the availability of machinery from foreign countries was upset by causes beyond the control of the engineers. In spite of these, we feel that sufficient attention was not paid and sufficient time not devoted to this matter of planning the job as we may call it, and even the field data had not been collected with that meticulous care nor the assessment of resources in men and material made with such realism as the size of this project demanded. The Chief Engineers when questioned by us, admitted that in the beginning "it had not been possible to estimate correctly the magnitude of the work involved". Another officer (Shri Ujagar Singh), who was connected with the preparation of the project report, similarly said—

"Complete field data had not been obtained when the first project estimate was prepared."
and work on the project had started even earlier.

3.14. In the course of our investigation, we have again and again come upon unfortunate mistakes that now seem preventable. For the Bhakra Main Line digging had actually started even before the longitudinal section had been finally and firmly approved, which later required a part of the same work to be done all over again. In the II Bhakra Main Line Circle, when the Bhakra Main Branch was being excavated, borrow pits were actually dug up at a place where a channel was to run and those borrows pit had later to be filled up and compacted to form the bed of that channel.

3.15. In the first Bhakra Main Line Circle and also Narwana Circle large stocks of cement and kankar lime were allowed to accumulate. In the Narwana Circle stores were ordered which were not even unpacked. At Patiala we saw a number of transport Vehicles that had stayed idle ever since the day they were purchased. In the II Bhakra Main Line Circle, some of the earthmoving machinery was working at rates considerably in excess of manual labour largely due to the absence of a suitable organisation to handle the machinery properly. A number of similar mistakes occurred at other places.

3.16. All these errors meant avoidable expenditure and all these were caused by the absence of a completed plan and lack of co-ordination between various parts of the project. We have been told that in a work of this size such errors are bound to occur. We are not convinced that there is anything inevitable about such mistakes and we have no doubt that it was the initial failure to appreciate the implications of the size of the project that led to these mistakes. We are speaking, of course, in the light of wisdom that has come after the events, but we are quite clear that in future before any project of any appreciable size is undertaken, the authority on the top must see that before any work starts a proper plan in all possible detail is prepared and is in the hands of all the subordinate officers responsible for its execution.

3.17. The weakest link in the plan for the project such as it was, lay in the personnel made available for its execution. We do not mean to belittle the ability of the engineers in the Irrigation Department nor to underrate the value of their past experience but we have the firm impression that resources in men which the project demanded, were not available and one reason for this was the failure to think ahead. When the construction programme was first laid down, the Chief Engineer apparently

Inadequate Planning for Personnel.

thought that a small expansion in the personnel of the Department would suffice. For the II Bhakra Main Line Circle, for instance the proposal was to have one Superintending Engineer, three Executive Engineers and ten Sub-Divisional Officers. In actual fact, at the peak of construction, six Executive Engineers in charge of six Divisions had to be employed and under them thirty-two Sub-Divisional Officers. The Superintending Engineer in 1952 represented that his circle should be split up into two, but possibly due to lack of available personnel, this proposal had to be turned down. Expansion of personnel which could well have been foreseen appears to have forced itself rather than being anticipated, and the recruitment of engineers was made only when it could no longer be postponed. Thus seventy-five temporary engineers were recruited in one year (1952) and fifty-three in the following year (1953). Most of these were raw and they had to be put directly in charge of Sub-Divisions without any particular training. It is this failure to train the engineers, before they were asked to take up their posts, that seems to us most regrettable.

3.18. Thus in the Nangal Circle responsible for constructing the difficult Nangal Hydel Canal, there were out of six Executive Engineers in 1952-53 only one who had more than four years' experience in that office and two of the Executive Engineers had less than two years' experience. Out of thirty-two Sub-Divisional Officers, twenty-five were promoted overseers and out of the seven temporary engineers given charge of Sub-Divisions, three had less than two years' service. Even out of the overseers, promoted as Sub-Divisional Officers, sixteen had less than two years' service. Conditions in the other Circles were a little worse. In the II Bhakra Main Line Circle, for instance, nearly all the Executive Engineers had no previous experience in that office and in the Narwana Circle, which was opened last of all, the Superintending Engineer had to be content with just the staff that had been left over. The result was that just at the crucial time of the peak of construction in 1952-53 and 1953-54, when quality was bound to tell, there was a general lowering of the standards all over.

3.19. In our general questionnaire, we posed the question whether the personnel available for construction was adequate regarding numbers and qualifications and the Chief Engineers returned this reply :—

“There is not the slightest doubt that the number of Engineers for construction was inadequate and did not possess the requisite experience.”

and they add :—

“It is clear from the above that a large number of inexperienced engineers were promoted as Executive Engineers during 1952, 1953 and 1954. These were mostly employed on construction work.”

3.20. Along with this state of affairs, we have the curious fact that between the years 1948 and 1952, no recruitment to the engineering services was made. We cannot believe that when this project was started, it was not realised that a large number of engineers would be required and we cannot, therefore, understand why engineers were not at once recruited starting with the year 1948. Shri R. R. Handa, who was in charge of the Bhakra Canals at the peak of construction says emphatically in his memorandum :—

“If recruitment had started in 1948, by 1952 those officers would have had about four years' service and could officiate as Executive Engineers if their work had proved good .”

3.21. The distressing fact, however, is that no recruitment was made sufficiently in advance to enable new entrants to learn their work and recruitment seems to have been made only when the speed of construction left no other alternative.

3.22. Discussing this matter with us the Chief Engineers stated :—

“The expansion in personnel was not clearly visualised in the beginning. That is probably the reason why recruitment of engineers took place year to year as requirements became clear. The inevitable result was that a number of engineers in charge of these divisions did not have the experience of construction or even experience of departmental practice as was clearly desirable. A very large number of overseers had to be promoted and given charge of Sub-Divisions and a large number of them had to be promoted and placed in charge of divisions as Executive Engineer.”

3.23. One reason mentioned is that it had not originally been intended to build the Bhakra Dam departmentally, and when that decision was taken, a large number of experienced engineers were diverted to the Dam.

3.24. Even more than the shortage of engineers, was the shortage of overseers, the most experienced of whom had to be promoted as Sub-Divisional Officers. In one Circle the number of overseers made available was 196, as against the actual sanctioned posts of 216. The overseers were not trained and there was little time to train them. The Chief Engineers have said that at one time almost anyone who had any pretence of having learnt anything in an Engineering Institution, whether recognised or not, was recruited. One Superintending Engineer (Shri A.S. Kalha) adverted to this matter in his letter to the Chief Engineer, dated the 9th April, 1953, saying :—

“Most of the Sub-Divisional Officers are yet quite inexperienced and it is risky to entrust construction Sub-Divisions to them, particularly so, when most of the overseers and the Sub-Divisional Clerks are also untrained. Also I feel that the introduction of such a large number of untrained overseers who are not conversant with the account procedure and the rules of this department, has introduced great weakness in the administration and it will be very difficult to clear up the accounts and irregularities.”

3.25. The warning was sound, but there was, at that stage, little or nothing that the Chief Engineer could do, and construction went ahead with the personnel as it was, with all its weakness.

3.26. The state of the clerical staff was no better. The Sub-Divisional Officer had the assistance of only one Sub-Divisional Clerk and one Assistant Clerk and the divisional offices remained more or less what they had traditionally been in the past. What is more important, the accounts staff soon became inadequate largely due to dearth of experienced Divisional Accountants, Accounts Clerks and Sub-Divisional Clerks and shortly after work had started in earnest, accounts began to fall in arrears.

3.27. In 1952, a Committee set up by Government did recommend an increase in the number of Accounts Clerks in each Division and also made other suggestions, but the Finance Department were unable to accept these recommendations owing to their financial implications. One result of these accumulated arrears in accounts had been that huge arrears staff has had to be sanctioned and whether even this much staff has been able to complete the work, this is even now a matter of conjecture.

CHAPTER IV

THE SCHEDULE OF RATES AND ITS DEFECTS

4.1. The story of rates and cost in the Irrigation Department largely revolves round a document called the Basic Schedule of Rates. This

<p>Basic Schedule of Rates of the Irrigation Department.</p>

contains a large number of items, mostly of labour, and against each item a basic rate is mentioned and then a premium payable in respect of it. The reason for these two entities is that when the schedule in its present form was first framed in 1943, low rates were prevailing and later on when rates began to rise, it was thought advisable not to alter the original rates but merely to add to them suitable premia to make the overall rate workable. This process continued from year to year, the hope being that some time or the other rates would revert to the 1943 level. Soon after Partition, however, it was clear that this hope would not be realised and a decision was taken to revise the Schedule. A Committee of Engineers was set up for this purpose and they produced a new Schedule in 1953 when the previous rates were slightly lowered in respect of certain items but otherwise the overall rates remained the same, the only improvement in the Schedule of 1953 being the fixation of a uniform premium in respect of all the items instead of different premia for different items previously in force. The importance of the schedule lies in this that generally a scheduled item can be paid the scheduled rate without further reference to any superior officer.

4.2. In order to obtain a clear idea about the reasonableness of rates appearing in the schedule, we wanted to know the exact departmental specifications concerning the various items and we were somewhat surprised to learn that such specifications were to be found only in the Handbook of Professional Orders, the latest edition of which was of the year 1926—over thirty years old. We enquired if this book was not largely out of date and we were told that it was, and what is more that many important items did not at all figure in the handbook. Even so, copies of these books were not available with all the officers of the Department. We understand now that the Department has been alive to the need of an up-to-date book containing detailed specifications but for various reasons, which we need not now go into, such a volume has not yet been printed although some chapters of it, we understand, have been written. The need for such a book is apparent. We have been assured, that the lack of recorded specifications has not hampered the Department to any appreciable extent, as all the engineers and nearly all the contractors employed by the Department are familiar with the specifications. Considering, however, that newer engineering techniques have come into the field and have been employed on the Bhakra-Nangal Project, and the fact that a number of temporary engineers fresh from colleges were entertained on the work, this assertion is perhaps too optimistic and we have actually come across evidences in the notes of Chief Engineers indicating that some of the subordinate staff were not conversant with the specifications. We, therefore, suggest that this omission should be made good as soon as possible.

<p>Absence of up-to-date detailed standard specifications.</p>

4.3. The second matter about the Basic Schedule of Rates, we wish to mention, is lack of clarity in certain items as they are expressed. We

<p>Vagueness and Ambiguity.</p>
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questioned several engineers about the precise meaning of some of the items appearing in the schedule and on occasions we received very conflicting answers, and some of the engineers frankly admitted, that some of the items were too vague to allow a clear idea of the work involved being formed and many others were capable of being misunderstood. The reason is that when these items were formulated—not in 1943 when the present shape to the schedule was given, but much earlier—they were valid in the context of circumstances then prevailing, but have ceased to be so under altered conditions. Experience shows that whenever a mere rule is allowed for long to

take the place of intelligence, it sooner or later happens that advantage is taken of the letter of the rule to the detriment of its real intention. We have seen this happen repeatedly in the course of this project, in connection with the Schedule of Rates, which is a compendium of rates governing payment and it appears that on several occasions, considerable ingenuity was pressed into service to bring a particular item of work within the terms of the Schedule, because the Scheduled rate happened to be favourable and no regard was paid to the actual nature of the work done.

4.4. During 1953-54, some mild steel bars were transported from one place to another in the Kaithal Division. In the Budera Sub-Division of that Division a considerable number of such bars were carried from the Railway Station to the stores, a distance of five to six miles. It was found that some of these bars were over 20' in length, some being as long as 35' to 40'. To carry these in motor trucks ordinarily available was found contrary to the Motor Vehicles Act and the Sub-Divisional Officer, therefore, decided to have these long bars folded up or bent, so that they could be conveniently placed in the trucks. There was really no item in the Basic Schedule of Rates to cover such work. The Sub-Divisional Officer, however, decided that item 17 of Part VII under the heading 'Concrete' could be applied. This item relates to the bending of reinforcement for Reinforced Cement Concrete work and the rate provided is annas 12 plus 100 per cent premium per cwt. It is now admitted that the skilled work of bending reinforcement mentioned in the schedule has no resemblance to the simple work involved in merely folding the long bars, but the Sub-Divisional Officer, anxious to bring this work within the terms of the schedule, decided otherwise and made payments at the rate above-mentioned. In one single transaction relating to the carriage of 692 tons of such bars, payment for bending alone was made to the extent of Rs 20,769. Other payments were similarly made. When the matter came to the notice of the Superintending Engineer, he had an experiment made in connection with this work and found that gross overpayment had been made and the Chief Engineers ultimately decided to fix a rate for this kind of work on the basis of that experiment. The rate sanctioned was in the case of bars of the thickness of 3/4" or less only annas 2 per cwt., and in the case of thicker bars, i.e., over 3/4 inch diameter, annas 6 per cwt. The payments made were in some cases twelve times the reasonable rate and in others at least four times. *From the bills we were able to lay our hands on, it appears that in this connection nearly Rs 33,000 was paid (while reasonable payment should not have exceeded Rs 5,000).* The Chief Engineers have ordered recovery of this amount. We gathered, however, that the contractor who received the bulk of payment, could not be traced and we are not surprised.

4.5. A similar muddle occurred at Patiala in connection with the carriage of certain items of machinery. During construction, machines like pumping sets, concrete mixers, generating sets, etc., were transported from place to place. The Basic Schedule of Rates contains an item under the main head "Carriage", which in connection with its rate is interesting. The item is No. 9 at page 16 and runs thus—

"Carriage of light machinery per ton."

	Unit	Rate			Premium
		Rs	A. P.	per cent	
(a) First thousand feet	.. 1000'	4	0	0	100
(b) Second and subsequent 1000'	.. 1000'	1	4	0	100

It is obvious that if any machinery which could be conveniently carried in a motor truck, were loaded in such a truck, say to its capacity of three tons

(if it were a three ton truck), the rate for its carriage for the first mile would come to Rs 61-8-0. The ordinary rate for hiring such a truck is in the neighbourhood of Re. 1 to Re. 1-4-0 per mile. It should be obvious, therefore, that this particular item in the Basic Schedule of Rates has and can have no relation to the transport of ordinary machinery capable of being carried in an ordinary truck. In view of the existence of this item in the schedule, however, no regard to any such consideration was paid and all kinds of machines, like concrete mixers and small pumping sets, were transported in trucks and paid for at the above rate. This matter came to prominent notice in connection with the carriage of two generating sets, which were actually heavy, from Patiala to Samana, a distance of about twenty miles. It was proposed to pay for this transport at the rate mentioned in the schedule. The Executive Engineer felt that the rate was high and what he did, therefore, was to allow the basic rate as contained in the schedule but to disallow the premium then in force. The basic rate alone worked out at Rs 67 per ton for twenty miles. The actual payment made to the contractor (Imperial Trading Co., Patiala) was Rs 1,206. It is admitted now that even this was much too high and it appears that later when the same generating sets were carried from Samana to the site of a cross-drainage work over a distance of twenty-four miles, i.e., four miles more than the original distance, the actual cost came only to Rs 300. The Sub-Divisional Officer (Mechanical) informed us in this connection that this amount of Rs 300 did not include the cost of loading and unloading the packages, but even if that were included, the actual cost would not be more than one-third of the amount paid and it will be remembered that the amount paid was without the premium while in connection with the carriage of several other items of machinery, the full rate including the premium has been paid. These two generating sets were somewhat difficult to handle but the items of machinery like small pumping sets and concrete mixers presented no such difficulty, and as the Superintending Engineer has now put it—

“there was no earthly reason for paying this heavy rate at all for the carriage of light machinery, like concrete mixers and pumping sets, as these could be easily carried on trucks without the help of a trailer.”

4.6. The curious fact is that while payments were being made, none of the officers took the trouble of discovering what the reasonable rate for such work should be and it does not appear to have struck anyone, as is now admitted, that the ninth item in the schedule under the head ‘Carriage’ concerning light machinery is merely intended for the haulage of machinery by manual labour over very small distances. These payments for the carriage of machinery have been made in a number of divisions. *According to the lists furnished to us, overpayments to the extent of Rs 3,300 appear to have been made.*

4.7. In June, 1951, some sal poles were carried from Patiala to Samana, again through the same contractor (the Imperial Trading Co.). These sal poles, of course, could not by any stretch of language, be brought under the general term ‘machinery’ and it was felt that there was no specific item in the Schedule of Rates covering the transport of such poles. The Sub-Divisional Officer found, however, that there was an entry intended to cover unspecified items and he suggested, therefore, that payment should be made accordingly. The item was in these words :—

Carriage of sal poles— Excessive rate paid.
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“All articles not specified above.”

First mile	.. 4 annas per maund.
Second and subsequent miles	.. 3 annas per maund Premium 120 per cent.

4.8. The recommendation of the Sub-Divisional Officer went to the Executive Engineer and was approved by him without either officer considering whether the rate in the schedule was reasonable in relation to the work involved. Actually, it appears that almost on the same day as the Executive Engineer approved the rate, this particular item was deleted from the schedule, presumably because it was found unreasonable and the actual rate subsequently provided for the carriage of unspecified items was reduced to 5 pies plus 100 per cent premium i.e., 10 pies in all per cwt. for the first mile and even further reduced for the subsequent miles. The reduction, it would be observed, was from annas 4 per maund plus 120 per cent premium, or in other words, about annas 9 per maund to ten pies per cwt. This reduction was not within the knowledge of the concerned officers at that time and they contended themselves with merely looking at the schedule and applying the rule without regard to its implications. Later on, when the time for payment arrived, it occurred to the Sub-Divisional Officer that the amount to be paid was too large and he, therefore, paid the running bill at the Basic rate only and cut out the premium of 120 per cent. When the second and final bill was prepared, however, the matter came to the notice of the Executive Engineer and what happened then is interesting. The Executive Engineer, instead of bringing his mind to bear on the question of the reasonableness or otherwise of the rate, took up the position that the full rate mentioned in the schedule having been approved by him and having been entered in the work order, there was no justification for reducing it and the Divisional Accountant actually noted on the file that the reduction arbitrarily made by the Sub-Divisional Officer was 'illegal'. An explanation from the Sub-Divisional Officer was called and although he indicated that the rate was reduced by him as it appeared excessive, this explanation was not found satisfactory. Ultimately, the full rate with a small reduction of 10 per cent was paid to the contractor. It is admitted now, that this work of carrying sal poles to a distance of 20 miles on a perfectly good road could have been done at almost one-fourth of the cost, but the Executive Engineer at the time merely chose to look at what seemed to him the legal aspect of the matter and did at no stage trouble to enquire as an engineer what the reasonable cost of the carriage of these poles should be. *The actual payment made to the contractor was Rs 4,250, while the Superintending Engineer has now stated that reasonable payment should not have exceeded Rs 390.* Thus, more than ten times the amount was paid in spite of the fact that the matter had pointedly come to the notice of responsible officers.

4.9. The instances we have mentioned do not readily fall into the category of honest mistakes, but even honest mistakes have occurred and

Rough Iron work— Excessive rate paid

proved expensive, just because once a particular rate got into the schedule, no one took the trouble to enquire whether it was otherwise reasonable.

In Section 20 of the Schedule, under the head 'Miscellaneous', there was an item No. 66, described as "Rough Iron work" including cost of iron and the rate provided for it was Rs 17-8-0 plus 100 per cent premium per cwt. i.e., Rs 35 per cwt. including the cost of iron which cost was in the neighbourhood of Rs 25 per cwt. One Superintending Engineer suggested that labour rate for this kind of work may be separately fixed. The Under-Secretary in the Chief Engineer's office got the impression that the recommendation was that labour rate alone for such work should be fixed at Rs 30 per cwt. and a proposal was put up to the Chief Engineer to sanction that rate. This was done. The anomaly is obvious, for against the normal rate of Rs 10 per cwt. (Rs 35 minus Rs 25 cost of iron) the actual rate approved was Rs 30 per cwt. and this impossible rate remained in force for nearly eighteen months and payments were made accordingly without anyone pointing out the anomaly. In one particular instance, some work connected with iron which had been quite differently described in the original estimate, was at the time of payment described as rough iron work, because the rate for rough iron work was profitable. The rate was subsequently corrected when the matter came to the notice of the Chief Engineers and the original error was described as a slip of the pen. The point we are making is that

when erroneous payments were being made, it ought to have struck somebody or the other that these payments were excessive, but nobody troubled to look at this aspect of the matter just because the rate was in the schedule. Even now we are not clear what rough iron work precisely means and when we discussed the matter with the Chief Engineers, they were themselves not clear in their mind. One Sub-Divisional Officer maintained that if a contractor punched just two holes in a sheet of iron, he will be entitled to receive payment at the rate of rough iron work. He admitted, of course, that that payment would be unreasonable if the sheet weighed say 5 cwt.

4.10. Centering and shuttering mentioned in the schedule is described under the two categories, 'simple' and 'intricate'. What precisely is 'intricate shuttering' has led to considerable controversy within the department. We came across several estimates in which for a particular work the shuttering required was described as intricate and provided for as such, but when those estimates went to the Chief Engineers' office, the item was cut out and substituted by simple shuttering. When, however, the time for payment came, the Field Officers were persuaded to pay for this item as intricate. Whichever view is correct, the fact remains that there has been unnecessary confusion about this kind of work which would not have occurred, if precise specifications for both kinds of works had been laid down, and made available to every officer.

Centering and Shuttering—
Vagueness of specification.

4.11. There was at one time a similar controversy about another item due to a curious mistake in the office of the Chief Engineer. A question had arisen whether the rate provided in the schedule for the supply of material, like shingle, and sand, includes or does not include royalty. The Chief Engineer concerned made an order in this respect in his own hand that the rate was exclusive of royalty. The Under-Secretary read this as inclusive, and issued orders accordingly. The matter was later brought to the notice of the Chief Engineer once again and the error was corrected, but in the meantime, the Chief Accounts Officer raised the question whether on a proper analysis the rate for the supply of material should or should not be inclusive of royalty and as the department did not possess any proper analysis their *ad hoc* argument that the rate excluded royalty was not so convincing.

Royalty—Conflicting decisions
on payment.

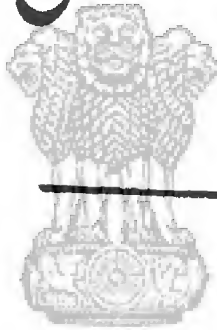
4.12. It should be clear from what we have stated above that the Basic Schedule of Rates is in respect of various items not very clearly expressed and in the absence of detailed specifications, it is liable to abuse. We are not sure if as it stands even now, all the rates are proper. During our enquiry our attention was directed to one item of carriage concerning coal. It was found that the contractors were willing to do this work at 20 per cent to 30 per cent below the scheduled rate. We discussed this matter with the Chief Engineers and it transpired that the rate as provided in the schedule was unreasonable. The rate provided for carriage of coal over a distance of five miles is Re 0-6-6 per maund and considering that a motor truck can easily carry three tons or 84 maunds of coal the payment for hiring the truck for running five miles would come to Rs 34-2-0. This item, therefore, we have brought to the notice of the Chief Engineers for further consideration.

Carriage of coal—Schedule
rate excessive.

4.13. In view of the importance of the Basic Schedule of Rates in the Irrigation Department, it is, we feel, imperative that the entire set of items to be contained in the Schedule should be carefully reviewed and realistic rates in the context of present conditions fixed for those items. It is equally imperative that as soon as practicable, the Department should compile and print a book of detailed specifications. It will also be useful to compile a standard data book, wherein quantities of materials and labour for important items are worked out.

Review of schedule of rates
and preparation of Data
Book and standard speci-
fications essential.

زنده گشت گریانش هزار مرغ به سیخ
به نیم بیضه که سلطان قسم روا دارد



If the king connives at injustice to the extent of (procuring) even half an egg ; his soldiery would freely roast a thousand fowls, (of course, illegally obtained).

SAADI.



सत्यमेव जयते

CHAPTER V

EARTHWORK AND ITS CLASSIFICATION

5.1. The largest single item involved in the construction of canals is "earthwork". This consists of various processes mentioned under twenty-six different heads in part I of the Basic Schedule of Rates. The most important of these is excavation, or digging up of earth either from the bed of the canal or from borrowpits and depositing it where required. The rate for this undressed excavation work with a lead of 50' is mentioned as Rs 6-8-0 per thousand c. ft. along with a premium of 100 per cent or, in other words, Rs 13 per thousand c. ft. for main canals and branches. (We have taken this rate from the third edition (1953) of the Schedule for purposes of convenience). The actual cost of excavating a canal, however, cannot be determined by just multiplying this rate by the quantity of earthwork involved. There is first the question of lead, or varying distance to and from which earth is to be carried, but apart from that, there are in the Irrigation Department a number of allowances paid over and above what is called the basic rate. The first of these is a bonus payable to every contractor, doing earthwork, whose average monthly bill in one quarter exceeds Rs 7,000, the bonus at that stage being 4 per cent of the value. This bonus increases to 10 per cent if the monthly bill averages more than Rs 50,000. There is then an allowance paid for wet work starting one to two feet above the spring level depending on the nature of the soil and the allowance is Rs 4 to Rs 8 for every thousand c. ft. There is a bigger allowance for slush varying from Rs 8 to Rs 16. There is then an allowance for hard soil varying from Rs 4 to Rs 8 per thousand c. ft. Next is an allowance for digging earth containing kankar or shingle, which depends on the percentage of shingle or kankar found in the earth, there being no allowance for a mixture upto 10 per cent and the allowance varying from Rs 3 to Rs 20 as the percentage rises.

5.2. The second part of the Basic Schedule of Rates is entitled 'Rock Cutting' and under it figure nine items. The first is described as 'Pick work' for which a rate of Rs 22 per thousand c. ft. is prescribed. Next comes 'Pick and Jumper Work' for which the rate is Rs 27-8-0. Item No. 3 is 'Jumper Work' with a rate of Rs 33. Next comes 'Jumper work with occasional blasting', the rate being Rs 38-8-0 per thousand c. ft. *plus* Rs 5 as cost of explosives. The next item, i.e. No. 5, is 'Blasting Ordinary' and the rate is Rs 55 per thousand c. ft. *plus* Rs 14 as cost of explosives. Next is 'Blasting Hard Rock', and the rate is Rs 66 per thousand c. ft. *plus* Rs 20 as cost of explosives. We need not go into the other items.

5.3. From the frame of the Basic Schedule of Rates, it appears that the first set of items i.e., Excavation, etc., relates to ordinary earthwork in the plains while the second set beginning with Pick Work and going down to Blasting, concerns work done in hilly tracts where rock is to be found. Actually, however, in the course of constructing the Bhakra Canals, these various items mentioned under Rock Cutting have been applied to earthwork in the plains and some of that earthwork paid at these rates. Another fact we have come across is that frequently excavation at first classified as of one type has later been reclassified as of another type. To get a clear picture of this story, it is useful to understand the basis on which the classification in the Schedule of Rates appears to rest.

5.4. The framers of the Schedule knew from previous experience that all excavation work is not of the same type, and that in the course of constructing canals, various types of soil have to be met and in case the soil is harder than the normal, extra payment for it has to be made. They provided for this in the shape of hardness allowance and provided a wide range of variation from Rs 4 to Rs 8 per thousand c. ft. In the project estimate, provision for hardness allowance was made on the assumption

that 25 per cent of the earth to be excavated would be harder than the normal. The standard for measuring hardness is laid down in the Basic Schedule of Rates in these words :—

“ Requiring repeated blows of Kassi to break it, depending on the nature of the soil .”

In the former schedule, another measure was also prescribed, that being of Dry Bulk Density exceeding 1.48. We are not particularly convinced if Dry Bulk Density as such, which of course, is a measure of compactness, is also a measure of hardness and for this reason perhaps the particular provision regarding Dry Bulk Density was omitted from the Revised Schedule of 1953. Shri R. R. Handa, Chairman of the Committee, who revised the Schedule, has stated that this condition of Dry Bulk Density was put in the original schedule of 1943 by one of his colleagues largely “to make it appear more scientific” and that it is neither a useful nor a proper test of hardness and the real test lies in actual observation on the spot whether the ground itself does or does not readily yield to ordinary spade work. So far the position is reasonably clear. Shri R. R. Handa, however, maintains that in actual practice the measure of hardness must vary not only with the nature of the soil but also with the workability of the rate in a given set of circumstances. What he says in effect is that the ordinary contractor has no interest as such in the soil structure of any particular piece of ground and that all he is concerned with is to ensure that for the work, which he actually does, he earns a reasonable rate inclusive of profit, and the Department has to accommodate him, so that, if the basic rate is low and unprofitable an allowance in one form or the other has to be allowed to him, and as hardness allowance is provided in the schedule, that allowance can be allowed even if the ground in question is not really hard. Shri Handa supports this argument by citing the instance of a previous project where all earth not being actually sand was classified as hard. He seems to think that this course is for practical purposes more helpful than would be the simple course of raising the basic rate. The complication which this approach to the matter necessarily introduces is this, that a readily understood conception of hardness is virtually destroyed and once it is destroyed or tampered with, control over subordinates becomes difficult. We have come across this confusion again and again and when we started an attempt to distinguish ordinary earth from hard earth, we were met with the assertion that it was not necessarily hard in the ordinary sense, but just a particular piece of work which had been paid for at a particular rate. If we have understood the argument correctly, it comes to this, that field engineers faced with the fact of rising rates, resorted to the device of paying an allowance which, strictly speaking, was not admissible, instead of adopting the straightforward method of getting the basic rate revised. We think that such devices are frequently calculated to damage that sense of integrity which it is necessary to maintain in a department and once they are resorted to, there is no sure method of preventing a serious abuse of such practices.

5.5. In the Narwana Circle a small channel called the Saraswati Feeder was constructed. The original estimate for this work was Rs 1,04,715.

Saraswati Feeder—Miscellaneous classification of earthwork.

The total quantity of earthwork was shown as 6,400,000 c. ft. and a provision in the estimate was made for hardness allowance to the extent of 10 per cent of the total quantity, i.e. 640,000 c. ft. Subsequently it was reported by the Executive Engineer that the strata of earth through which the channel passed was hard and the provision of 10 per cent hardness allowance was inadequate and he accordingly proposed hardness allowance to the extent of 50 per cent of the total quantity. The Superintending Engineer did not agree and cut down this provision to 10 per cent. This was on the 14th November, 1953. A fortnight later on 26th November, 1953, sanction was, however, accorded by the same Superintending Engineer to the extra allowance and not only that ; but the entire picture of this earthwork was altered. Out of the total of 6,400,000 c. ft., 3,398,000 c. ft. was described as Pick and Jumper

work, another 2,841,000 c. ft. as hard earth and only the balance of 161,000 c.ft. (odd) remained as ordinary earth. This particular case was later investigated at some length and the opinion of a geologist had to be obtained whose report indicates that the bulk of the earthwork was ordinary and fully capable of being handled with an ordinary spade. This is possibly an extreme case. It is also conceivable that circumstances were such that, a higher rate than the one anticipated at first, had to be paid ; but we find ourselves unable to acquiesce in the suggestion that the extra cost involved justified a reckless misdescription of the type of work actually done.

5.6. In the excavation of the Bhakra Main Branch in the Tohana Division (R.D.0—130,000) out of a total quantity of about 11 crores c. ft. of earth, about 10 crores has been classified as hard and similarly over a large portion of the Bhakra Main Line nearly cent per cent hardness allowance has been allowed.

**General classification in
Bhakra canals.**

5.7. The main cause of hardness met with in the Bhakra Canals appears to be the presence of Kankar in the soil and our inspection of a number of pits dug specially along the main canals showed that at a number of places kankar, in a fair proportion, is to be found. We have also noticed certain clay formations of a hard kind and we can well understand that excavation at these places must have required the use of sharp pointed picks. The schedule provides for an allowance of Rs 8 per thousand c. ft. for maximum hardness making an overall rate of Rs 13 plus Rs 8, i.e., Rs 21 per thousand c. ft. For admixture of kankar up to 40 per cent the allowance provided is Rs 9 per thousand c. ft. or in other words, an overall rate of Rs 13 plus Rs 9 i.e. Rs 22 per thousand c. ft. For Pick Work also the rate is Rs 22 per thousand c. ft. It will thus be observed that for a proportionate increase in human effort involved in excavation, a corresponding rate has been provided and appropriately described. In the present project, however, the rates actually paid for some of the work exceeded the rates mentioned above and instead of merely kankar allowance or the maximum hardness allowance or pick work rate, higher rates as provided for pick and jumper work, jumper work, and even blasting were paid and the various quantities so paid have been described in the official records as jumper work and blasting, etc. The Auditors pointed out that in the plains of the Punjab, such operations as jumper work and blasting work could not be reasonably expected, and this controversy ultimately led to a major scandal and in the result, a number of responsible officers were placed under suspension.

5.8. Regarding blasting, which is undoubtedly a surprising item, in the context of excavation done in the alluvial plains, two versions have been placed before us. One is, that in certain reaches, the work was so hard that blasting had actually to be done and it was necessary. The other and the more popular version is that although actually no blasting was done and it was perhaps unnecessary, the blasting rate had to be paid because no contractor was willing to do the work at a lower rate. We went into this matter in some detail with Shri R. R. Handa and with some other engineers and we were not surprised to find that most of them were unable to state from their personal knowledge that blasting was actually done. Neither Shri Handa nor the other officers questioned by us appeared to have been even familiar with the particular explosives said to have been used and all they appeared to have concerned themselves with, was that difficult excavation work was actually done at a certain rate provided for in the Schedule although described as blasting. The Superintending Engineer, Narwana Branch (Shri K. R. Sharma) did describe to us an attempt at blasting carried out in his presence on the Narwana Branch when some explosive material was poured into a number of holes dug in the ground and somehow detonated, but in the result nothing very much happened, so much so that he finally declined to pay the cost of explosives. We were not really concerned with

Blasting.

the facts whether at some place or the other blasting was actually done or attempted. We have only to consider whether blasting as such was necessary to be done and, therefore, the high rate provided for blasting necessary to be paid. Shri L. S. Gupta, who was the Superintending Engineer, 1st Bhakra Main Line Circle, has frankly admitted that the excavation work at the places where blasting is said to have been done, could have been done otherwise, with the help of jumpers etc., but it would have taken longer time, and towards the close of the construction there was not sufficient time available. From our own inspection of various sites, however, we can say that, in our opinion, the material said to have been subjected to blasting was with one minor exception, where sheet kankar was found, not suitable for such treatment and even if, in fact, explosives were used, those explosives were largely wasted. The earth formation at some of these places is undoubtedly hard, but we have seen fairly large pits going down to the level of the canal bed dug at these places by ordinary labourers working with ordinary implements, namely, spades and picks, and although, of course, that took longer time than digging a similar pit in ordinary soil, there was no insuperable difficulty in doing so. It has been said that these reaches were so hard that no contractor had touched them or was willing to touch them and they were, therefore, left over till the very last and since the work had to be completed by a certain date, it was necessary in the large interest of the project to pay excessive rates which could only be covered by such items as blasting or jumper work. Assuming this, for a moment, to be true, the plain course was to get the rates revised and there seems no reason why this simple and straight forward method was not adopted to meet the contingency. By resorting to the objectionable method of misdescribing the work, the engineers tied themselves up to certain rates. Assuming for instance, that the rate of Rs 22 per thousand c. ft., was not sufficient for a particular piece of work, the officers concerned by deciding to pay for it at the next higher rate, namely that of pick and jumper, were committed to pay at the rate of Rs 27-8-0 per thousand c. ft., involving a jump of Rs 5-8-0 at once. The next higher rate of Rs 33 involved another jump of Rs 5-8-0. It is, of course, not readily believable that if any work could not be done at Rs 22 it could only be done at Rs 27-8-0 and so on.

5.9. We tried to ascertain if such rates as Pick and Jumper work, and blasting, had ever been paid at any time previously in the Punjab. Shri Significant misclassification R. R. Handa, who claims to have had the longest construction experience, does not say that any such rates had ever been paid before. Shri A. S. Kalha, a senior officer in the Irrigation Department, admitted that to his knowledge such rates had never been previously paid. The impression of the other engineers including that of the present Chairman of the Central Water and Power Commission, is similar. It is, therefore, clear that these descriptions or classifications were brought into service only for the purposes of the Bhakra Canals and to put it at its best, they were pressed into service for the purpose of making it appear that nothing outside the terms of the Basic Schedule of Rates was being done although it involved the engineers in a serious distortion of facts. We have to repeat our disapproval of such practices for these not only involve responsible officers in questionable conduct, but also encourage the subordinate staff in unscrupulous methods, and must, if overlooked, lead to serious leakages of money.

5.10. In the beginning of the project certain reaches in the main canals, i.e., Bhakra Main Line, Bhakra Main Branch, and the Narwana Branch were reserved to be excavated by machinery. Earthwork by machinery. In August, 1950, when Shri R. R. Handa was the Superintending Engineer, 1st Bhakra Main Line Circle, he pressed the Chief Engineer to permit him to do the entire work by manual labour and the correspondence shows that he was against the use of machinery, and represented that such use would involve frequent breakdowns, delays and possibly extra cost. The Chief Engineer was at first not persuaded. In December, 1950, however, Shri R. R. Handa wrote again for a reconsideration of the former decision and in support of this, categorically stated that

if the work were done by manual labour very little extra payment over and above the hardness allowance provided in the Basic Schedule of Rates would be necessary. In his letter No. 2267/W, dated the 19th December, 1950, he said :—

“I have consulted my Executive Engineers as to the extra allowance that they will require for completing the earthwork in their divisions over and above the hardness allowance allowed in the Basic Schedule of Rates for manual labour. The Executive Engineer, 1st Division, wants nothing over and above this. In the IInd Division there are certain kankar reaches and the Executive Engineer wants only Rs 35,000 extra. The Executive Engineer, III Division, wants nothing extra. Hence the total extra amount required in addition to the rate for normal earthwork is Rs 35,000.”

Such was the picture in view when digging had actually started and some of the work was being held up for lack of machinery. Within the next three years, however, this picture was completely altered and not only were various new and novel items made to appear in the contractor's bills but the extra cost mounted up and has run into lakhs.

5.11. Under the Rules of the Department, sanction to Hardness Allowance is accorded by the Superintending Engineer, who had to satisfy himself about the nature of the soil on a personal inspection, if necessary. In practice, however, we gather that the Superintending Engineer depends largely on the advice of the Executive Engineer who has better opportunity of spot inspection but even he at times depends on the information received from the Sub-Divisional

**Grant of Hardness etc.
Allowances—Irrregular pro-
cedure followed.**

Officer. We had occasion to look at the record of some of the sanctions accorded by the Superintending Engineers and found these sanctions in surprising detail. Not only did the sanctions relate to each particular reach but even in respect of each reach there were details from foot to foot in the depth of the excavations. This at first sight indicated that very great care had been taken about this matter. Subsequently, however, we were surprised to find that these detailed sanctions had been on many occasions radically altered by the same Superintending Engineer. To mention some instances, the Superintending Engineer, II Bhakra Main Line Circle, accorded certain sanctions to hardness allowance payable in respect of certain reaches in 1951 and 1952. Some work was actually done and payments made in accordance with these sanctions. About two years later, however, all this was altered and instead of a mere hardness allowance, pick and jumper or jumper rates were allowed. The Accounts Officer has furnished us with one statement which is not, of course, exhaustive and that alone shows a payment of Rs 1,92,705 in excess of the amount payable in accordance with the original sanctions. More surprising is the fact that some of the revised sanctions were accorded as late as June and August, 1954, long after the excavation work had been completed and at a time when neither the Superintending Engineer nor any subordinate officer could possibly have inspected the spot, because in the meantime, the canal had been lined. Shri A.S. Kalha, who was questioned about this matter, could only state that in all probability sanctions on the revised scale had been asked for a good deal earlier and the matter remained under correspondence and the formal sanctions were accorded in June and August, 1954. We are not fully satisfied with this and we feel that there has been too light-hearted meddling with the classification of excavation work which apart from lending colour to motives leads to endless suspicion which can be avoided.

5.12. In the Narwana Circle also something very similar happened. Sanctions were first accorded by the Superintending Engineer to the payment of hardness allowance for various depths in different reaches and later

on these were radically revised and higher allowances were sanctioned. In none of these cases, records of field observations by the Superintending Engineer on which the classifications were made, are available.

5.13. In the II Division of the 1st Bhakra Main Line Circle certain payments for earthwork at the rate of blasting were made to a number of contractors and in the bills payment for the cost of explosives was included. The Auditors required a certificate that the explosives had actually been used and when faced with this, the Irrigation Officers decided to cut out the cost of explosives from the bills although the blasting rate was allowed to stand. The resulting anomaly is obvious for no blasting could be done without explosives and to pay the contractor the blasting rate but not the cost of explosives merely amounts to an admission that no blasting was done. We could multiply these instances ; but we feel that we have said enough to bring out the fact that there has in connection with the Bhakra Canals, been serious misclassification of excavation work and the misclassification was on a wide scale.

5.14. We have thought it necessary to express ourselves somewhat strongly about this matter because we feel that several responsible officers in the Irrigation Department have not been fully alive to the danger of such misclassification. Shri R.R. Handa, who was Chief Engineer, Bhakra Canals, during the crucial period, appears to have thought it of no consequence, if wholly soft earth was actually described as hard and paid hardness allowance, his justification being that the initial rate provided in the schedule was so low that no work could be done at that rate and hardness allowance had, therefore, to be paid nearly everywhere. When he was Superintending Engineer, 1st Bhakra Main Line Circle, his Chief Engineer, Shri S.D. Khungar, pointed to this fact in April, 1951, and said :—

Misclassification—A device to raise rates.

“The provision made by you for hardness is very much on the high side. It appears that hardness is proposed to be paid to practically every cubic foot of earthwork. I notice that in some places the earth is very soft and no hardness allowance should have been paid at all. Please say if you or your predecessor has personally verified, that, for the work already done, the amount of hardness is correct”.

Shri R.R. Handa virtually ignored this warning and merely replied that he had kept a general control and made enquiries on the spot and felt satisfied that the rate paid by adding basic rate for hardness allowance and other charges was not unreasonable. When we discussed this matter with him and pointed out that hardness allowance appears to have been paid for earth which was not hard at all, he replied that there was nothing particularly wrong about this ; although, in a manner of speaking, this involved the adoption of wrong nomenclature. He agreed that the initial rate could have been raised, as we feel it should have been, if the rate was unworkable ; but he insisted that the wiser course in the interest of economy was to keep the initial rate low and to allow hardness allowance liberally without particular regard to the nature of the work. We are possibly too acutely conscious of the confusion that must arise in supervision if such a method is adopted and we cannot help repeating that it is much better to provide in the Basic Schedule of Rates a properly workable rate for ordinary earthwork and to permit hardness allowance only where the work justifies that description. It is, we hope, unnecessary to say that the adoption of questionable means can never be justified by the achievement of any particular end and experience consistently shows that the adoption of wrong means almost invariably defeats the contemplated end. Shri Handa was at the head of the Department and we are inclined to think that the laxity on his part in the matter of proper description may well have encouraged the staff working under him to freely adopt such items as Pick and Jumper Work, Jumper Work and finally blasting, in connection with canal excavation in the plains.

5.15. We have already mentioned how as Superintending Engineer, 1st Bhakra Main Line Circle, he persuaded the Chief Engineer to permit him to proceed with the entire excavation with manual labour instead of waiting for machinery and to make his point, assured the Chief Engineer that the extra cost over and above the ordinary hardness allowance would not exceed Rs 35,000.

Change over to manual labour in reaches reserved for machinery.

When we placed this matter before him he stated that the figure of Rs 35,000 was a mere guess and that quite possibly he mentioned this low figure to be able to convince the Chief Engineer about the soundness of his proposal. Later when Shri Handa had returned to Simla after discussion he wrote to us suggesting that the figure of Rs 35,000 mentioned in the official correspondence was so ridiculously low that it could not have been consciously mentioned by him and he suspected that the original figure may have been later tampered with by some one. We have gone into the records again and verified the facts. There seems no doubt that Shri Handa was at that time so convinced of the futility of using machinery that he did not think it improper to get rid of inconvenient facts. We have mentioned this incident to illustrate how too much pre-occupation with the end to be achieved can lead to the adoption of steps which have subsequently to be regretted.

5.16. Shri Handa stated to us that when he was Chief Engineer, he would not have hesitated to raise the initial rate, if a proposal had been made to him. That, of course, would have been the proper course and we think that such a proposal was not made because, he, and for that reason the officers under him, found it convenient to get over the necessity of revising the rate by simply misdescribing the work. The fact that Shri Handa was the Chief Engineer may well have been the deciding circumstances. Shri Handa has been frank with us about these matters and we owe it to him to say that much of the responsibility for large scale adoption of wrong nomenclature in respect of excavation work is to be attributed to his own strongly held views in this respect.

Proper remedy.

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CHAPTER VI

NANGAL HYDEL CHANNEL

6.1. By our terms of reference we are required to 'inspect representative sections along the Nangal Hydel Channel and the Bhakra Canals and after scrutinising the relevant accounts, to estimate the order of excess expenditure on these canals that may be attributable to mal-practices, inefficiency, or neglect.' While determining the excess expenditure, we are particularly required to take into account certain factors mentioned in the terms of reference under six different heads. Our task thus is to discover if expenditure in excess of the reasonable limit has been incurred which may have been caused by inefficiency or neglect or dishonesty. Before proceeding further we would like to clear the ground by making two observations. Firstly, our task is not merely to determine the amount of money spent over and above the estimated cost of each work. Such excesses have been numerous, largely due to faulty estimates; but nothing is to be gained by counting those excesses. Our interest is only where the actual expenditure has exceeded the reasonable limit—reasonable in all the circumstances attending the execution of the work. Secondly, it is not within the scope of our enquiry to fix individual responsibilities for the excesses that have occurred. It has, at times, not been possible to avoid pointed references to individual officers, but those references are merely intended for the facility of the narrative and if any individual is to be firmly saddled with responsibility of any act of neglect or inefficiency or dishonesty, further detailed investigation will be necessary.

6.2. We have attempted to make our selection of the items investigated as representative as possible, but it is inevitable that in a work of this magnitude, some quite important parts might be omitted and the danger, therefore, of generalising from particular instances is real in this case and we wish to guard ourselves against that danger.

6.3. We have examined the earthwork involved in the excavation of five major canals, namely:—

Works selected for scrutiny.

- (1) the Nangal Hydel Channel,
- (2) the Bhakra Main Line,
- (3) the Bhakra Main Branch,
- (4) the Narwana Branch, and
- (5) the Bist Doab Canal

by selecting certain reaches for detailed scrutiny. We have considered the work of lining two of these canals (the Bhakra Main Line and the Narwana Branch) in some detail. We have been picked out a number of important cross-drainage works for detailed examination. We have examined the question of stores, i. e., the quantities purchased and the rates paid. We have considered the cost of carriage of material. We have also examined a number of other miscellaneous items and tried to make the picture as comprehensive as practicable. We have dealt with each canal separately in respect of the quantities of earthwork involved; while we have discussed the matter of rates for earthwork at one place separately.

6.4. It is convenient to begin with the Nangal Hydel Channel. This canal has been described as the most difficult ever built and considering the country through which it runs and the high cuttings and deep fillings it involves, the description is not an exaggeration. The canal is forty miles long and runs almost parallel to the Sutlej river and thus right across the path of the hill torrents that drain into the river. And there are sixty-four of them involving the construction of as many cross-drainage works.

6.5. Work on this canal started even before the Partition and several estimates for excavation were framed at a time when the full discharge of this canal was intended to be nearly 2,000 cusecs smaller. The discharge was raised when it was decided to raise the height of the Bhakra Dam and this change naturally upset all the estimates framed on the earlier assumption. A good part of the excavation work for the canal was done with machinery and not many engineers in the Department were fully familiar with the working of earth-moving machines and the cost of running those machines, with the result that some of the earlier estimates were too optimistic in respect of such costs. We are happy to record, however, that soon afterwards, the Field Division in charge of the earth-moving machinery was placed on a sound footing and required to work on rates fixed by the Chief Engineers, which rates were in most cases 48 to 70 per cent lower than the manual rates. Excavation work on the canal went on right up to the beginning of 1954 over a period of nearly eight years and in the meantime, numerous Overseers and several Sub-Divisional Officers were transferred from one reach to another with the result that normal check over measurements could not be exercised strictly. These are some of the reasons responsible for very large excesses over estimated expenditure. They do not, however, entirely explain all the excesses and as will persently appear, some of the excesses have to be attributed to over-measurements either due to neglect or design.

6.6. We have first examined the reach R. D. 9,500 to R. D. 35,000. The original estimate for this sanctioned in February, 1948, was for a sum of Rs 17,60,845. A revised estimate was framed in December, 1953, for Rs 30,10,627 which was sent to the Chief Engineer for sanction in December, 1954, and the Chief Engineer reduced it to Rs 28,44,019 by disallowing certain items which he considered unreasonable. By that time, of course, the work was over and it now appears that the actual expenditure incurred was Rs 32,51,055. The revised estimate had not till the time of our inspection been resubmitted to the Chief Engineer. The situation is curious.

6.7. The quantity of earthwork involved in this reach was originally estimated as 567.80 lakhs c.ft., but it appears that there was an error in the abstract of quantities—an error of about 10 lakh c.ft. and we have now been assured that the correct quantity according to the estimate should have been 578.12 lakh c. ft. The actual quantity of earthwork paid for, however, comes to 649.98 lakh c. ft. The excess thus works out to 71.86 lakh c. ft.

6.8. In the revised estimate, several explanations for the excess earthwork done and paid for were mentioned, and the quantities attributed to various causes indicated. On these calculations, there remained a gap of about 12 lakh c. ft. of earthwork. When we started investigating into the matter it transpired that the quantities attributed to various causes could not be supported by official record. We, therefore, asked the officers concerned to make a thorough search of all the record and to let us know how various excesses had occurred. Shri V. P. Duggal, who was in charge of this reach during 1952-53 was assisted by the Sub-Divisional Officers concerned and he has stated that the reasons for the excess in quantities to the extent that they are supported by the measurement or level books are as follows:—

(i) Inequalities in level	.. 3.94 lakh c. ft.
(ii) Removal of Bunds	.. 0.47 " "
(iii) Rain cuts	.. 1.47 " "
(iv) Extra for compaction	.. 10.00 " "
(v) Making of ramps	.. 1.15 " "
(vi) President's visit	.. 5.58 " "
Total	.. 22.61 " "

It has then been stated that there were other causes for excess which are also supported by record and which have been discovered subsequent to the framing of the revised estimate. These are mentioned as follows:—

(1) Removal of silt thrown by a number of khuds running across the canal	..	9.29	lakh	c. ft.
(2) Removal of loose gravel found in the bed of the khud	..	1.51	„	„
(3) Making of protection bund	..	0.95	„	„
(4) Making of water-course from the river to the canal for compaction	..	1.35	„	„
(5) Earthwork for compaction at the site of silt ejector	..	2.02	„	„
(6) Providing clay blanket on top of the bank		5.40	„	„
(7) Extra earthwork due to removal of boulders from borrow pits		1.35	„	„
(8) laying of patra on top of the lining	..	7.06	„	„
(9) Digging of trial pits for classifying earth-work	..	0.66	„	„
Total	..	29.59	„	„

Adding up these two sets of figures, the extra earthwork thus explained comes to 52.20 lakh c. ft. There still remains unexplained the excess of 19.66 lakh c. ft. It has been generally stated that the work had been going on for a number of years and there were more rain cuts the measurement books indicate and that there might have been variation in levels at more places than what the record shows. We see no reason why the record of all work done in connection with rain cuts should not have been recorded if a part of that work was recorded nor why variation in level should not have been detected if any existed. Even in respect of the explanations offered for excesses which are recorded in the measurement books we find that some of the earthwork said to have been done could have been avoided if proper care had been taken from the beginning; but as these matters are slightly controversial, we propose to take no notice of them. We, however, find that 19.66 lakh cft. of earthwork was paid for in excess of the reasonable quantity after making every allowance for every cause for excess which the officers have been able to think of. It is important to note that this particular reach is for the most part in cutting and no substantial error in the quantities involved could be made. *We conclude, in the circumstances, that 19.66 lakh c.ft. of earthwork has been paid for because of overmeasurement in quantities which under proper and efficient supervision need not have occurred. The cost of this earthwork at Rs.40 per thousand c. ft., will come to Rs.78,000.*

6.9: The next reach we have examined runs from R.D. 64,964 to 71,760. The work in this reach also started before the partition, although

Excavating Nangal Hydel
Channel. R. D. 64,964—
R. D. 71,760.

the first estimate, we have been able to see was sanctioned in December, 1948. This was for a sum of Rs.10,20,351. It was estimated at that time that the total quantity of earthwork would be 236.05 lakh c.ft. In 1950, however, the Ex-

ecutive Engineer (Shri Ravi Kant) noticed that a much larger quantity of earthwork yet remained to be done than he should have expected and he framed a revised estimate and reported that although up to that time 156.20 lakh c.ft. of earthwork had been recorded in the measurement books and actually paid for, there still remained on the spot 148.74 lakh c.ft. of work to be done.

This made a total of 304.94 lakh c. ft. These figures were slightly modified by the Superintending Engineer who calculated that the work still remaining to be done was 141.66 lakh c. ft. While explaining the excess, he stated that while he could in one way or another account for the excess of 35.47 lakh c. ft., he could in no manner account for the balance. This report of the Executive Engineer was at first accepted by the Superintending Engineer who sent up the revised estimate to the Chief Engineer, but the enormous excess revealed, disturbed the Chief Engineer and he returned the estimate directing an immediate enquiry. The Superintending Engineer then deputed his Personal Assistant (Shri Madan Lal) to investigate the matter in detail. That officer went into the figures again and increased the accountable excess on some of the items but finally reported that there still remained a gap of 16.17 lakh c. ft. of earthwork which could not be accounted for at all. We do not propose to enter into the difference of opinion between the Executive Engineer and the Personal Assistant to the Superintending Engineer, concerning the accountable quantity and would depend only on the facts about which there is no dispute.

6.10. A part of the excess over the original estimate was due to some mistakes in the estimate itself. A part was caused by a small increase in the free-board of the canal and some excess was caused by the boulders that came out of the excavated material. Apart from these items the Executive Engineer had reported that an excess of 4.71 lakh c. ft. was due to unnecessary cutting or wrong filling contrary to the design. Shri Madan Lal accepted this figure as correct and attributed it to lack of supervision and control.

6.11. The Executive Engineer had next calculated that an excess of 10.76 lakh c. ft. had occurred; because some quantity of earth had been deposited at wrong places where it had become surplus and was thus virtually wasted. Shri Madan Lal estimated this quantity as 14.65 lakh c. ft. and remarked that :—

“Much of this work had been done by the Muslim staff before the Partition and there had not been proper supervision over them at the proper time.”

6.12. Besides these two items, Shri Madan Lal reported that about 100' length of the built embankment of the canal had been washed away during the floods as the embankment had been built right in the bed of the Lamlehri Khad. To quote his own words:—

“Approximately 100' length of the built up embankment and compacted bank in the Lamlehri Khad had been washed away during the last two or three flood seasons. In fact, it was a mistake to have started construction of an embankment in the khad prior to completion of the cross-drainage works. The quantity of the earthwork involved in the portion of the embankment, that got washed away, is 5.06 lakh c. ft.”

We found it very difficult to believe that any engineer could have built up the canal bank right in the way of a hill torrent where it was certain to be washed away during the floods and when we questioned the officer actually engaged on the work (Shri Saudagar Singh) he stated that the canal bank had not been built in the bed of the khad but only up to the high edge of the hill torrent and he adds:—

“In July, 1948, a part of the bank of the canal was washed away. It was unprecedented flood and at that particular point the torrent happened to directly hit the canal bank and scoured out about 100' of it. The natural surface level of the ground was higher than the previous flood level of the torrent. Damage done to the earthwork by flood was only about one lakh c. ft. and not five lakh c. ft.”

We are inclined to believe that Shri Saudagar Singh states. It is apparent that Shri Madan Lal was able to increase the accountable quantity of earthwork by adding to the quantities that had for one reason or the other been

wasted and since we are concerned with counting the excess expenditure caused either by neglect or dishonesty or inefficiency, the ultimate picture for our purpose remains the same. Accepting the figures worked out by Shri Madan Lal, it would appear that 16.17 lakh c. ft. of earthwork had not been done at all, and over and above that 4.71 lakh c. ft. plus 14.66 plus 5.06-24.42 lakh c. ft. of avoidable earthwork had been done. If we accept Shri Saudagar Singh's view regarding the last item of 5.06 lakh c. ft. said to have been washed away due to flood in the Lamlehri Khad, this total of 24.42 lakh c. ft. will be reduced to about 20.40 lakh c. ft., but then another 4 lakh c. ft. would remain unaccounted for. The only other explanation mentioned before us concerns a small quantity of about 35,000 c. ft. of earthwork which Shri Saudagar Singh says he actually did in the beginning of the construction. His statement is that it was intended to build a kind of reservoir between R.D. 66,070 and R.D. 66,300, the intention being to admit the water of the Charan Ganga into the canal at that place and thus not to build the left bank of the canal at all. Subsequently, however, after 35,000 c. ft. of earthwork had been done, this decision, was reversed and both the banks of the canal were built and the hill torrent was made to pass under the canal through a syphon. The quantity involved here is insignificant and we are mentioning this fact only to indicate that even responsible officers like the Executive Engineer who was holding charge of the Division in 1950, and the Superintending Engineer at that time, do not appear to have been aware of all the facts concerning some of the work done. *To sum up, we find that a considerable quantity of this earthwork had in this reach been either wasted or not done at all and this quantity comes to 16.17 plus 4.71 plus 14.56 plus 5.06=40.59 lakh c. ft. Assuming an average cost of Rs 40 per thousand c. ft. the excess expenditure works out to Rs 1,62,000*

6.13. The revised estimate for this reach was actually sanctioned but the booked expenditure is nearly Rs 2 lakhs in excess of that. We have been told that there has been a good deal of wrong booking in respect of this estimate and considering the confusion in which we have found the accounts, we are inclined to believe this. We wish to mention one more fact in connection with this estimate. The Chief Engineer on receiving the revised estimate had ordered an immediate enquiry and he wished the report to be sent up to him within two weeks so that prompt action could be taken. Actually, however, several months elapsed before any report was submitted and there is no evidence that any effective action was taken.

6.14. In between these two reaches and relating specifically to the portion between R. D. 58,500 and R. D. 59,300, we came across an estimate amounting to Rs 38,917 framed for the removal of uncompacted filling and laying it afresh. This was in the beginning of 1953. The report accompanying this estimate reads thus :—

Removing	uncompacted
refill R. D.	58,500—
R. D. 59,300.	

“In this reach the canal embankments on both sides had been laid some years ago but no compaction was done, inasmuch as the soil was to be lined. It is necessary to remove the loose earth up to the natural surface level and compact the bank.”

The report added that the earth used was of poor quality and unfit for compaction. We examined Shri Harbans Singh, Executive Engineer, who was concerned with this work and he stated that quite possibly before the Partition, it was not thought necessary to compact any portion of the bank, even for purposes of lining and for that reason perhaps some earth unfit for compaction was laid on the banks. We find it difficult to believe that compaction was thought wholly unnecessary in connection with a lined canal and it seems far more probable that due to lack of proper supervision unsuitable earth was placed on the bank and allowed to remain there for a number of years. It was only in the beginning of 1953 that this matter was considered in detail and since this reach happened to be immediately above the Ganguwal Power-house, it was considered unsafe to take any risk with the quality of

compaction and it was, therefore, decided to remove the unsuitable earth and to replace it with more suitable material. *It cost Rs 35,000 and it is obvious that the extra cost was due to original inefficiency in supervision or wrong conception of work.*

6.15. The next reach we have considered runs from R.D. 140,000 to R. D. 150,000. The Bhakra Control Board also desired in their 45th meeting held on the 20th/21st July, 1956, that the revised estimate for excavation of this reach be scrutinised by us.

Excavating	Nangal—
Hydel—R. D.	1,40,000—
R. D.	1,50,000.

6.16. Originally, an estimate amounting to Rs 5,95,000 was sanctioned for the above reach. This work was started in February, 1948 and completed in May, 1954. A revised estimate amounting to Rs 7,12,036 was sanctioned in April, 1951. It is, however, found that the actual booked expenditure up to March, 1956, on the work amounts to Rs 17,99,000, showing an excess of Rs 10,86,964 on the revised estimate.

6.17. The following is the position in regard to the quantities of earthwork :—

<i>Earthwork quantities</i>		Units
Total earthwork as actually paid for	..	36,956
Total earthwork as per original estimate	..	25,758
Total excess	..	11,198

(N.B.—One unit=1,000 cft).

We shall now examine the details of the earthwork quantities sub-reach-wise.

6.18. The first sub-reach is R. D. 140,000, 143,800—This is a partly filling and partly cutting reach—

	Units
(a) Earthwork as per actuals	.. 7,465
(b) Earthwork as per original estimate	.. 4,920
Difference	.. 2,545

This difference (excess) is explained as below :—

- (i) A quantity of 1,652 units resulted from revision of L-Section. This is supported by cross-sections and may be accepted.
- (ii) A quantity of 237 units has been due to the provision of extra compaction allowance at 16 per cent. As this is within the permissible limit of 20 per cent, this quantity may be accepted.
- (iii) A quantity of 35 units is said to be due to silt clearance.
- (iv) A quantity of 393 units was excavated and had to be refilled consequent upon the revision of Longitudinal section. The work is said to have been done in 1948. The L-Section was revised in April, 1949. As the first Revised Estimate was submitted at the end of 1950, this quantity should have been included ; but somehow it was overlooked. As this quantity is also supported by cross-sections, it seems acceptable.

- (v) A quantity of 104 units was used for making an approach bank at R. D. 143,640 for the service road across the railway line. With a wise husbanding of resources, a large part of this earthwork could have been utilised and used for the completion of the canal embankment. This, however, was not done, and so a quantity of 104 units had to be wasted.

6.19. In spite of the above explanations, there is yet an unexplained difference of 124 units. There is nothing on the record to support this excess. It is generally explained as due to rainwash.

6.20. We now come to the sub-reach R. D. 143,800—R. D. 146,932 which consists of high-filling—

	<i>Units</i>
(a) Quantity as per actuals	.. 12,284
(b) Quantity as originally estimated	.. 8,719
	<hr/>
Difference	.. 3,565
	<hr/>

The following explanation in regard to this excess has been noted :—

- (i) Increase due to change-over from low embankment to high embankment .. 949 units.

As this is due to change in design, it is admissible.

- (ii) Excess due to compaction allowance .. 379 units.

- (iii) A quantity of 381 units has been arrived at by taking detailed cross-sections at point where there was significant change of levels due to undulation and configuration. Cross-section exists in support of this and as such this may be accepted.

- (iv) A quantity of 1,993 units is said to have been brought from the lower adjoining cutting reach and is recorded as such in measurement books. It will thus be seen that taking items (i) to (iv) together, the excess explained works out to 3,702 units as against 3,565 units required to be explained ; which shows that an excess quantity of 137 units (viz, 3,702—3,565) over and above the requirement was transported to this reach. What happened to this quantity and where it was used is not explained. There are no cross-sections to support this. Besides, as no mechanical means of transport were adopted and presumably only the beasts of burden were used for transporting the cutting spoil, the inference that one can draw is that overpayments have been made for a quantity of 137 units, which at an average earthwork rate of Rs 45 per unit amounts to Rs 6,165.

6.21. In this connection, it may be observed that in the sanctioned 1st revised estimate, a quantity of 5,710 units was proposed to be brought from the lower cutting to be used in this high-filling reach. However, actual quantity shown to have been utilised is only 1,993 units as stated above. Thus a quantity of 3,717 units (viz., 5,710—1,993) remained unutilised. This has been due to the verdict of the Assistant Research Officer, who declared the soil unfit for compaction. In so far as the Irrigation Officers are concerned, they seem to have followed the Assistant Research Officer's direction though it is not clear how a line of demarcation was drawn

utilising 1,993 units only and rejecting the quantity of 3,717 units. Even though the soil appears to be sandy as actually observed at site, it could have been utilised in the formation of high embankments where porous material would have been helpful for drainage. The rejection of such a large quantity was not in the best interest of economy and a little discretion on the part of the Executive Engineer might have been helpful.

6.22. The following is the position with regard to the sub-reach R. D. 146,932 to R. D. 147,923 :—

	Units
(a) Quantity as per actuals ..	3,592
(b) Quantity as per original estimate ..	1,792
Difference ..	<u>1,800</u>

6.23. The excess of 1,794 units is correctly explained having been due to the work actually executed and supported by Cross sections, being at closer interval than at first. This leaves a small quantity of 6 units unexplained. This might be passed over.

6.24. The last reach R. D. 147,923 to R. D. 150,000 was excavated largely by machinery. The quantities are as follows :—

	Units
(a) Earthwork as per actuals ..	15,607
(b) Earthwork as per original estimate ..	10,327
Difference ..	<u>5,280</u>

This excess is satisfactorily explained having been due to :—

(i) Detailed Cross Sections at closer intervals ..	3,110
and (ii) Lowering of the top of bank levels as per Chief Engineer's special orders ..	2,170
Total ..	<u>5,280</u>

6.25. It will thus be seen that there has been a loss under the following sub-heads:—

	Rs
(a) 124 units excess earthwork paid for in sub-reach R. D. 140,000—143,600 at average rate of Rs 45 per unit ..	5,580
(b) Excess transport of 137 units from the spoil reach at average rate of Rs 45 per unit ..	6,165
(c) 3717 units not utilised from cutting reach at Rs 45 per 1,000 c. ft. ..	1,67,000
Total ..	<u>1,78,745</u>
or ..	<u>1,79,000</u>

6.26. The next estimate we have examined relates to R. D. 170,000 to 180,000. The original estimate for this work was of Rs 3,72,038. A

Excavating Nangal Hydel
Channel—R.D. 170,000—
R.D. 180,000.

revised estimate was later prepared and this came to Rs 10,97,625. The actual expenditure booked up to August, 1956 is shown as Rs 11,43,366. Some of the excess in expenditure was caused by a change in the section of the canal as its capacity was raised by 2,000 cusecs. The bulk of the excess, however, is due to another reason. It was hoped in the beginning that the earth for this reach would be obtained from borrow-pits nearby, but it seems that this was found impracticable later and in particular the owners of the land where borrow-pits were to be laid strongly protested and in all the circumstances, it was decided by the Chief Engineer that earth should be obtained from a hillock near village Ghanauli which, although not far from the canal, still involved a lead of 1,400 feet. At the same time the hillock contained gravel and excavation from it involved payment of gravel rate. In this manner, against the original estimate rate of Rs 44 per thousand c. ft., a rate of Rs 66-9-0 per thousand c. ft. was paid.

6.27. The Superintending Engineer actually took us to the site and explained that there was no better place available from which earth could have been readily obtained. He pointed out that if borrow-pits had been laid in the land adjoining the canal, it would have necessitated the acquisition of several acres of good agricultural land and in any case the borrow-pits would have spread over a long distance involving long leads because the water level at this place is barely one to two feet below the ground. It appears to us that the proper method of tackling this work would have been with machinery. This is in fact admitted and is apparent also from the note of the Chief Engineer on the revised estimate pointing out that the work could be carried out more economically with machinery. By that time, however, practically the whole of the work had been completed and we are further told that in any case the necessary machinery was just not available and the canal had to be completed quickly. We have accepted the explanations although we are left with a feeling that before incurring a good deal of extra expenditure, the possibility of obtaining machinery from some other reach ought to have been given deeper consideration.

SIRSA AQUEDUCT

6.28. The Sirsa Aqueduct, which carries the Nangal Hydel Channel over the Sirsa Nadi, is the biggest cross drainage work, we have come across during our investigation. The Sirsa is a perennial river with a flood discharge of 1,50,000 cusecs. Combined with the Aqueduct is a bridge for the public road from Rupar to Nangal. The total cost of this work is shown as Rs 81,66,815. The work is founded on 210 wells originally designed for a depth of 26' below spring level but later sunk to a depth of 38'. This variation, of course, necessitated a revision of the original estimate and that revised estimate had not been sanctioned at the time we began looking into the accounts.

Sirsa Aqueduct.

This work was done in three stages :—

- (1) the sinking of the wells ;
- (2) the construction of a number of piers, some of them departmentally ;
- (3) the construction of the remaining piers and the super-structure.

6.29. The first, of course, was the sinking of the wells. In August, 1948, the Executive Engineer called for tenders for sinking these 210 wells with the then intended depth of 26'. In the tender notice the depth actually mentioned was 28'. The notice was issued on the 28th August, 1948, and the last date for receipt of the tenders was fixed as 20th September, 1948. This notice was issued in the press and was somewhat brief mentioning four items, the last being well-sinking involving a displacement of 9,89,000 c. ft. of earth. A more elaborate notice mentioning more details was subsequently drafted and circulated to every division, but that happened only on the 19th of September, 1948, barely twenty-four hours before the tenders had to be opened. The explanation offered is that it is usual in the Irrigation Department to publish in the press a short notice indicating the kind of work intended to be done while it is left to the interested parties to obtain further information from the office of the Executive Engineer in which office, more detailed information is compiled and kept. On the 20th of September, 1948, when the tenders were to be opened, it was found that only one single tender had been received, the contractor being Beant Singh Harbhajan Singh. There are some unusual features about this tender which we feel bound to record. It is initialled by the Executive Engineer; but the tender register contains no mention of this particular tender. We found a blank page in the tender register where probably this tender would have been entered and it may be that it was intended to be so entered there, but for some reason which the Executive Engineer could not explain, no such entry was ever made. Further, from the evidence before us, it appears that the entries in the tender are in the hand of the Overseer employed in the Department although we were unable to get hold of the Overseer in question for examination. The rates quoted by the contractor were not a percentage below or above the schedule but in respect of each item, a separate rate was mentioned. It has been stated, however, that nearly all these rates were the same as mentioned in the Basic Schedule of Rates and we have, therefore, taken that the intention of the contractor was to quote at par with the Basic Schedule. There was, however, one exception concerning the item of 'Well Sinking' and it is largely this item that deserves consideration. It figures as item 7 in the tender. The contractors quoted two alternative rates for this item—one described as 'a labour rate' and the other as 'through rate'. The document reads thus :—

Item No. 7 Well Sinking	Approximate quantity	Rates tendered percentage above scheduled rates	
		c. ft.	Rs
(a) Well sinking in boulders, shingle, sand or clay, but except rock or compacted sand, of 28' depth	989,000	Rs 1-7-0 per c. ft., of earth displaced	
(b) Through rate ..	989,000	Rs 1-15-0 per c. ft., of earth displaced	

Below the tender was a note which really forms the basis of the contract and it reads thus :—

"N. B.—(1) In the case of labour rate well sinking item 7(a) all machinery will be run by the department including cost of coal, lubricants, etc., and pay of mechanical staff and drivers. All machinery, equipment, coal, lubricants, etc., and loading material including cement empty bags, etc., and all sorts of ropes will be department's concern.

(2) In the case of through rate for well sinking, item 7(b) loading material such as B. G. rails, wooden sleepers, ballies, empty cement bags, etc., will be supplied free of cost by the department which will also lend six Barnard pumps complete with suctions and deliveries forthwith and steam hoists complete with all equipment, i. e., dredgers, derrick, wire ropes, pulleys, shafts, kerb wrenches etc., The Department will also supply petrol coupons for working pumps and arrange for the supply of steam coal, kerosene, diesel and mobil oils and grease, etc., etc., at actual control rates at the contractor's cost.

(3) The Department will supply petrol coupons for carriage of material by trucks,"

6.30. Without going into details at this stage, the broad meaning of the two alternatives would appear to be this, that in the case of the labour rate the machinery was to be supplied and run by the department at their own cost; while in the case of 'through rate' machinery was to be supplied by the department but run by the contractor at his own cost. The difference between the two rates was 0-8-0 per c. ft. of earth displaced and considering that the quantity of earth displaced had been computed as 9,89,000 c. ft., it straightaway meant a difference of almost of Rs 5 lakhs. We should have thought, in the circumstances, that the question whether the one alternative or the other was more economical would have been carefully considered by the Executive Engineer. For this purpose, it would have been necessary for him to consider the kind of machinery that would be required for the process of well sinking, the time that the process will take and the cost of running such machinery departmentally and only after going into these details and working out actual figures could he or for that matter, anybody else, have formed any clear idea whether it was better to accept the labour rate (Re 1-7-0) per c. ft., or the through rate (Re 1-15-0 per c. ft.). We are amazed to find that the Executive Engineer had never made any such attempt and the Divisional records show no indication that anybody else had done so. To quote his own words :—

“I do not think any attempt was made in our office to estimate the cost of running the machinery that would be involved in the sinking of wells or to find out whether it was better to accept the through rate by the contractor or the labour rate, the difference between them being Re 0-8-0 per c. ft., which I notice, makes a considerable difference to the actual cost. It would have been better if this had been done.”

We found that the tender having been opened on the 20th September, 1948, it was sent up to the Superintending Engineer within two days with a recommendation that the through rate of Rs 1-15-0 should be accepted. There was no consideration of the matter stated above by the Superintending Engineer either, and the tender with a formal recommendation found its way to the office of the Chief Engineer within another three or four days ; and was promptly sanctioned by him and sent back to the Superintending Engineer on the 6th October, 1948. We were so struck by the unusual speed with which this tender appears to have travelled up and down that we felt bound to probe into the matter further and we discovered that, in fact, at the time the tender was opened or shortly after that, the Chief Engineer happened to be out on tour in this division and discussed this tender with the Executive Engineer, Shri A. R. Talwar and approved of it. We asked this Executive Engineer whether it would not have been wiser to call fresh tenders, considering that only one tender had been received in respect of this big work and there was no indication whether the rate tendered was truly competitive.

“My recollection is that the Chief Engineer had indicated orally earlier than the 1st October, 1948, that he would approve of the tender received. He knew about it. It was for this reason probably that it was considered unnecessary to call fresh tenders although only a single tender had been received.”

6.31. The presence of the Chief Engineer on the spot and an expression of opinion by him regarding the reasonableness of the tender thus appears to have prevented the Executive Engineer not only from considering the advisability of calling tenders afresh, but also from considering a very necessary matter concerning the merits of the two alternative rates actually offered. When we raised this matter with the Chief Engineer (Shri Sarup Singh) he

frankly admitted that the monetary implications of the two alternatives should certainly have been worked out and he added :—

“I cannot remember how this was omitted, if in fact, the Executive Engineer and the Superintending Engineer did omit to work out the alternative costs. I do feel that normally the cost would have been worked out, so that it could be ascertained whether the first rate or second rate was more economical.”

6.32. It has been very difficult for us to understand how any officer could have decided on choosing one out of these two alternative rates without investigating the implications of both. As we have stated, the difference in the two rates works out to nearly five lakhs of rupees and considering that later the depth of the wells was increased to 38', the quantity of earth displaced came to considerably more and also the money value, if the difference in the two rates is applied to the full depth of the wells. We tried to ascertain what expenditure had in connection with the running of machinery, been debited to the contractor and recovered from him and we gather that this was only of the order of about Rs 2 lakhs, but of course, it is stated that some of the machinery was run with the help of drivers employed independently by the contractor, the precise cost of which cannot be discovered. We, however, strongly suspect that this extra cost could not have been so much as to close the gap between Rs 5 lakhs and Rs 2 lakhs and although we cannot mention any figure, we feel that at the least, *a lakh of rupees could have been saved if instead of the through rate of Rs 1-15-0, the labour rate of Rs 1-7-0 had been accepted.*

6.33. Going back to the tender or rather the agreement that came into being in consequence of the acceptance of this tender, we find that a number of matters were left largely vague and unrecorded, and some of them gave rise to considerable argument. To begin with, the contractor, was, of course, to be provided with the necessary machinery, the nature of which he had indicated, but was he to be charged anything for this machinery by way of hire ? Was he to be charged for the depreciation of this machinery ? Who was to be responsible for repairs ? The official record gives no clear answer. Then again, during construction some protection bunds and diversion bunds were constructed and a question arises whether these works being for the facility of the contractor, they were to be put up at his cost. About these matters, we questioned the Executive Engineer in whose time the tender was accepted and the Executive Engineer, who later made various payments and also the Chief Engineer, and although on most matters we were finally able to obtain a large measure of agreement among these officers, we found that before making a reply to any of these questions, each of these officers had to think a good deal. The matter of depreciation and hire charges for machinery was—actually argued between a succeeding Chief Engineer (Shri R. K. Gupta) and the officers on the spot, and it was settled only after a long time. It is, we feel, not wise for the department to commit itself to an agreement the exact terms of which are not a matter of record in some form or the other, and it is clear that it would have saved a good deal of time and effort, if the implications of the through rate, as it was called, had been reduced to writing.

6.34. Regarding bunds, the Executive Engineer as well as the Chief Engineer made a distinction depending on the size of the bund. In the words of the Chief Engineer,—

“If the contractor put up a small local bund, the cost was to be paid by him ; but if a big bund to divert the river or a ring bund to prevent flooding were constructed, the department had to pay for it.”

Concerning repairs similarly the Chief Engineer said :—

“Running repairs for the machinery lent to the contractor should have been borne by the contractor, but the cost of overhauling borne by the department.”

There is no evidence if the contractor ever paid for building any bund small or big, and although it has been said that some repairs to machines were done at his own expense, we are far from convinced about this matter. It is obvious that the kind of arrangement visualised by the Chief Engineer left considerable room for argument, and we cannot help remarking that such loose understanding about matters involving expenditure of public funds places too large a strain on the discretion of local officers and should, therefore, be avoided. No serious dispute actually arose in connection with this work because the contractor appears to have been accommodated in every respect.

6.35. The high water mark of that accommodation was reached when the simple task of digging out some debris from some of the wells was described as 'Resinking' and the contractor paid at the rate for 'Well-sinking'. It appears that between the 14th and 19th July, 1949, a flood came in the Sirsa which breached the protective bund round the wells at pier No. 3 and five wells got filled with debris. This, of course, had to be cleared before the process of sinking the wells could restart; and a question arose as to the rate to be paid for this work. The Executive Engineer decided to call this work partly 'Re-sinking' and partly 'Gravel excavation', the distinction drawn being that up to the top of the steining before the flood, the work should be described as re-sinking and the debris above the top of the steining was to be treated as gravel work and paid for at ordinary excavation rate. It is perfectly clear that no real well-sinking was involved in the clearance of debris, and however well packed the debris may have been, the removal of it was simply the dredging of gravel from inside the wells. The difference between the ordinary excavation rate for shingle, which is round about Rs 30 per thousand c.ft. and the rate for well sinking which was fixed at Rs 1,940 per thousand c. ft. is enormous and we can find no justification for confusing the two. We discussed this matter with the then Chief Engineer (Shri Sarup Singh), and he agreed with us saying :—

Dredging from partly sunk wells-called re-sinking.

“ This should not have been paid for at the same rate as provided for the sinking of wells. That appears unjustifiable. The rate for this kind of work should have been ordinary earthwork plus something more. I might say two or three times the ordinary earthwork rate, but nothing resembling the rate for sinking of wells. ”

Actually, however, the contractor was paid the higher rate. The Executive Engineer stated that he had discussed the matter with the then Superintending Engineer, Shri B. R. Lamba, and had his approval to the higher rate. Shri B. R. Lamba, however, had no recollection of this matter and he wrote in January, 1956 :—

“ It is impossible for anyone to remember verbal orders alleged to have been given six years back. It was the duty of the Executive Engineer to have got the verbal orders confirmed if any such orders were given, particularly when it was the question of fixing a rate for an item not exactly stipulated in the work order. In spite of my hard thinking, I have not been able to recollect if any verbal orders were given to call the work as 'well-sinking' ”.

In the meantime, the matter was taken up by the succeeding Superintending Engineer, who suggested that a deduction of 10 per cent may be made, which merely meant reducing the rate of Rs 1,940 per thousand c.ft. to Rs 1,750 per thousand c. ft. Finally, in February, 1956, the matter was referred to the Chief Engineers and their reactions appear to have been very similar to ours. The Chief Engineer (North), Shri M. L. Batra, noted on the file :—

“ I am inclined to agree with Audit. If the wells had got filled up by floods, the item would probably be one of excavation within the well and not sinking at all. Cost of pumping will be extra. Secretary, South, kindly advise. ”

On this the second Chief Engineer, Shri S. L. Malhotra, wrote :—

“ I agree with Secretary, North and fail to see how the item of removal of silt debris could be classified as re-sinking.”

Officially, the case has stood just there and no final decision has been made. We are clear in our mind that the work was misdescribed to justify the higher rate paid to the contractor without any reference to the Chief Engineer. The total bill on this item came to Rs 38,502.

6.36. In the contractor's bill there is an item called 'Site Clearance' which has been paid at Rs 5 per thousand on the value of work, and the total amount paid comes to Rs 24,930. **Site Clearance—Excessive payment made.** Shri G. K. Vij, Executive Engineer, has told us that in the later schedule, the rate for this item has been reduced to one-half. It has been difficult to understand what kind of site clearance the contractor was called upon to do in this particular case to deserve a payment of nearly Rs 25,000, or even half of it. We have been told that the material taken out of the wells in the course of well-sinking was dumped by the contractor close to the works, and when he was required to carry it away from there and dispose it of in a proper manner, he demanded and was actually paid for its rehandling at the scheduled rate. There might have been some more debris lying near about but it could have been left to be washed away by the next flood. Actually, therefore, it appears that in connection with this particular job, no site clearance was really necessary unless it meant the removal of tools and plant from the site which the contractor was in any case bound to do. We feel in the circumstances, that this payment of Rs 24,930 was ill-deserved and a much smaller payment of say about Rs 1,000 would have been ample. *Nearly Rs 24,000 have thus been paid to the contractor in excess.*

6.37. During 1949-50, five bunds were constructed under five different estimates as follows :—

Temporary bunds during Construction—Responsibility for.		Rs
(1) Constructing bund for piers 5 to 10 for sinking 210 wells sanctioned,—vide Superintending Engineer, Nangal Circle No. 9384/23W, dated the 17th September, 1949	..	15,321
(2) Excavating diversion bund for diverting the left creek, Sirsa, sanctioned,—vide Superintending Engineer No. 9059/23W, dated the 9th September, 1949	..	13,519
(3) Repairs to enclosure bund, damaged during floods and raising it to R. L. 918 for carrying out works from piers 5 to 10 during monsoon for sinking 210 wells, sanctioned,—vide Superintending Engineer No. 10721/23W, dated the 11th February, 1950	..	29,341
(4) Constructing second diversion bund in left creek Sirsa Nadi sanctioned,—vide Superintending Engineer No. 2139/23W, dated 11th February, 1950		2,125
(5) Constructing enclosure bund around pier No. 17 to 20 in the right creek of Sirsa Nadi	..	2,225
Total	..	62,531

6.38. It will be noticed that even a small bund round pier 17 to 20 costing about Rs 2,000 was charged to the department, although it was a small local bund for which the contractor should have been responsible. The first two estimates were sent up to the Superintending Engineer after the work had been done. We find from the correspondence that that officer protested against this method and observed about the first:—

“The work was executed in June-July, 1949. There is no justification for sending the estimate in September, 1949. This takes away discretion of the Superintending Engineer to alter design or to change specifications in order to effect economy and to improve designed work. The execution of works without estimates in future must be rigidly deterred.”

When the second estimate was received in similar circumstances after the work was over, he repeated :—

“In future no work of this nature should be allowed to start anywhere in the division without an approval of the estimate which must be obtained by the Executive Engineer before allowing commencement of work.”

We have failed to find any evidence that this warning was heeded and we have come across numerous works started without estimates again and again. The cost of the bunds formed a part of the cost of well-sinking and when, therefore, we consider the reasonableness of the rate of Rs 1-15-0, notice has to be taken of the fact that over and above the actual payment made to the contractor at Rs 1-15-0 per c. ft., substantial expenditure was otherwise incurred on ancillary works.

6.39. The main item of work was, of course, the sinking of wells themselves. When the estimate was actually framed, no proper analysis for the item of well-sinking was prepared. On the Divisional file we have seen an analysis of rate which was at some stage submitted by the contractor, but the figures therein are not helpful and the analysis was prepared merely to justify the rate tendered by the contractor. In the estimate, provision for well-sinking was made at Rs 2 per c.ft. The only basis of this was some information with the Executive Engineer that on the adjoining work undertaken by the Railway Department in connection with the construction of the Railway Bridge, which is only a few feet upstream from the Sirsa Aqueduct, a rate of Rs 2-6-0 had been paid. Later on, however, when enquiry was officially made from the Railway Department, it transpired that their overall rate for well-sinking including every item came to Rs 1-13-6. It is significant that the wells for the Railway Bridge were sunk to the same depth as the wells of the Sirsa Aqueduct. When comparing these two rates we have to take into account the fact that the Hindustan Construction Co., who did the work for the Railway Department, used their own machines and made every other arrangement like the putting up of diversion bunds or ring bunds at their own cost. The Railway did allow them some limited facilities for transporting machinery but the cost of these did not exceed a few thousand rupees. It is, in these circumstances, clear that the rate paid by the Railway for this item of work was substantially lower than the rate of Rs 1-15-0 paid by the Irrigation Department. The story, however, does not end there. The rate of Rs 1-15-0 was tendered for a depth of 28'. Subsequently, however, it was decided to sink the wells to a depth of about 40', and the contractor then asked for a higher rate for deeper sinking. This matter was then considered on its merits and a higher rate was sanctioned starting from Rs 2-8-0 per c.ft. and going up to Rs 2-14-0 per c.ft. as the depth increased.

Rate of well-sinking excessive.

6.40. We agree that the deeper sinking involved harder work and as the officers on the spot have assured us that very hard strata of earth had been met with even up to a depth of 28', there was justification for enhancing the rate, and we appreciate the dilemma in which the departmental officers were at that stage placed, being faced with the choice of letting the old contractor go away and risk consequent delay, but assuming that there was justification for some increase, it is clear that the increase made was based on the assumption that the original rate of Rs 1-15-0 was reasonable, which itself rested on the false assumption that the Railway Department had paid a higher rate. Working out the difference between the Railway rate of Rs 1-13-6 and the average overall rate of Rs 2-2-6 as paid by the Irrigation Department, *we find that the total overpayment in respect of 14,43,725 c.ft. of earthwork displaced will come to Rs 4,51,164 or Rs 4,50,000. To this must be added the cost of the bunds, i.e. Rs 62,500.*

6.41. We have not taken into account the depreciation charges of the machinery, although in the case of the Railway this was wholly a liability of the contractor. Nor have we taken into account other facilities and concession accorded to the contractor, who appears to have been paid even water allowance amounting to Rs 3,894.

6.42. The work of constructing the piers started in October, 1950, not through a contractor, but through Department agents. The reason **Construction of piers.** mentioned is that the estimate for the piers was not ready, but the real reason seems to be that the Superintending Engineer wanted to discover at what rate this work could be done before giving it out on contract. The work was confined to four piers No. 1, 3, 8 and 21, which were completed by the middle of 1951. The work was found difficult, but not inexpensive, and it was, therefore, decided to call tenders for the remaining work. Tenders were invited on 7th July, 1951, and opened on the 14th July, 1951, within a week. Considering the volume of the work, the time allowed seems to have been too short. Only two contractors tendered for the work—one at 3 per cent below the schedule and the other at 2 per cent below the schedule and the Superintending Engineer refused to approve either. Fresh tenders were, therefore, called on 10th September, 1951. At that time, however, only one contractor put in a tender namely, Harbhajan Singh-Gurbachan Singh, the rate offered being 1.5 per cent below the schedule. The Sub-Divisional Officer was, then, asked to negotiate the rate with the contractor and he succeeded in persuading him to undertake the work at 3 per cent below the schedule. This time the Superintending Engineer agreed. We have noticed that for another work on the Nangal Hydel Channel for which tenders were called about the same time, as low a rate as 8.75 per cent below the schedule was obtained but it may be that this particular work was unattractive for some reason.

6.43. The Department had been able to construct through their own agency four piers and the contractors, Messrs Harbhajan Singh-Gurbachan Singh constructed 14 more. For the remaining work including the work of the super-structure tenders were finally called on the 18th January, 1952, and opened on the 1st of February, 1952. Five contractors tendered, the lowest being 11.8 per cent below schedule by Messrs Mohinder Singh-Gurbachan Singh. On 2nd February, 1952, the Chief Engineer again happened to be on the site of the work and discussed the matter of tenders with the Executive Engineer and verbally approved of the lowest tender and as in the case of well-sinking, the recommendation of the Executive Engineer became a matter of form. Shri Sarup Singh has stated before us that it was by sheer coincidence that he happened to be on the spot on the two occasions when the tenders were opened and that there was nothing unusual about discussing this matter with the Executive Engineer as the Sirsa Aqueduct was an important work which had been considerably delayed and he was anxious to complete this work as quickly as possible.

CHAPTER VII

NANGAL HYDEL CHANNEL

LEADS FOR PRINCIPAL MATERIALS

7.1. The cost of carriage of material like shingle, boulders and sand enters into the cost of masonry works and also the cost of lining. This cost depends on the distance from which the material is carried, which, in turn, depends on the location of various quarries for such material. The Nangal Hydel Channel is crossed by a number of hill torrents flowing into the Sutlej which for the most part runs parallel to the canal and is nowhere very far from it. The various quarries are located in the beds of these torrents. The Superintending Engineer, Nangal Circle, prepared a quarry chart for our assistance in which he marked the various quarries from which shingle, boulders and sand were obtained. In order to check whether these quarries were in relation to different works the nearest available we inspected a number of these quarries and made investigation into the type of material available. We had, in this connection, the willing assistance of the Resident Geologist, Bhakra Dam, Shri Krishnaswamy, to whom we are highly indebted.

7.2. Considering the large number of these torrents and the equally large number of different quarries, it struck us that this question of fixing suitable quarries for different works should have required a good deal of planning in the beginning and while enquiring into this we actually came across a fairly comprehensive plan in the form of a blue print that was prepared in the beginning by the then Superintending Engineer, Shri B. R. Lamba. In this blue print the various quarries were indicated and the various leads from these quarries worked out. These leads as then calculated varied from one to four miles in most cases and only in respect of two or three came to six miles. It appears, however, that after Shri Lamba was transferred from this circle, this blue print was lost sight of and the officers in charge of execution do not appear to have been aware of its existence till it was unearthed during our investigation. No particular advantage was derived from this planning.

7.3. In July, 1951, the Bhakra Control Board wished to decide whether cement-concrete lining or tile lining should be adopted for the Nangal Hydel Channel and the Superintending Engineer, Shri A. C. Malhotra, was asked to go into the question and he prepared a note in November, 1951, indicating the comparative costs and in that connection worked out the various leads for the carriage of shingle and sand. These leads were at places more liberal than those worked out by Shri B. R. Lamba, but even so, the longest lead allowed was six miles.

7.4. Actually, however, we found that shingle had quite frequently been carried over much longer distances. Similarly, in the case of boulders for cross-drainage works much longer leads had been allowed than the location of the quarries seemed to justify. It appears that mostly in the estimates, the quarries from which material was to be obtained

Choice of other than nearest quarries resulting in wasteful leads.

were not mentioned and also in the work orders issued to the contractors the quarries from which he was to bring the material were not specified. This must have made the work of checking the various leads extremely difficult. It also appears that there was no systematic plan according to which the quarries were to be worked in relation to the nearest site where material was to be used and the contractors and the subordinate staff were largely left to make a decision in this respect as and when the need arose. Out of this confusion, a large number of amazing contradictions have arisen which indicate that if this part of the work had been done according to a systematic plan, a good deal of money could have been saved.

7.5. For a number of cross-drainage works, like, Tarapur Aqueduct (R. D. 76,965), Jhinjri Aqueduct (R. D. 81,263), Mehndwan Aqueduct (R. D. 84,838), large quantities of shingle were carried from Lohand (R. D. 1,06,619) over a distance of seven to nine miles. When, however, the Lohand Canal Syphon was built a large supply of shingle (nearly 2,33,000 c. ft.) had to be brought from another quarry on the river three to five miles away.

Leads for Cross-drainage Works.

Again, for the Jhinjri Aqueduct (R. D. 81,263) a small quantity of shingle was brought from Mehndwan (R. D. 84,838) and for Mehndwan Aqueduct itself a large quantity was brought from a distance of nine miles from Donala and Brahmpur. For the Nakian Syphon (R. D. 97,288), although shingle was obtainable from the river four to five miles distance (and about 80,000 c. ft. was actually obtained from there) a substantial quantity was obtained from Lohand (R. D. 1,06,619) and about 25,433 c. ft. was obtained from Lotan Khud (R. D. 1,25,908) and the lead allowed was ten miles. For the Kotla Superpassage (R. D. 92,433), which is about five miles from Lohand, some supplies were obtained from Lohand, but some from the river a distance of five to eight miles and some actually obtained from Brahmpur—a distance of nearly fifteen miles. About Lohand, it was stated before us that the quarry there was much in demand, the supplies got exhausted quickly and other sources had, therefore, to be tapped and that within a distance of three miles there was “beautiful shingle available” near Sarai Pattan to which recourse was, therefore, had. It is curious, however, that this beautiful shingle quarry at Sarai Pattan was not thought of when the Nakian Syphon (R. D. 97,288) was being constructed and some shingle was brought from Lotan nine to ten miles away. It is also curious that while Lohand remained a source of supply for a number of works seven to eight miles away, the supply was found exhausted when the syphon at Lohand itself was being constructed. The proper course would have been to allot these supplies to the nearest works instead of allowing the quarry to be exhausted in supplying distant works.

7.6. When we considered the cost of Lamleri Aqueduct (R. D. 68,763) we found that shingle was available in the bed of that Khud and some quantity was obtained from there, but apart from that there was a quarry in the bed of the Sulej at Agampur, a distance of six miles. A large quantity (1,64,000 c. ft.) was obtained from Lohand and Brahmpur nearly eleven miles away.

7.7. Concerning Dabatwali Aqueduct (R. D. 46,390), a large quantity was obtained from Brahmpur, a distance of seven miles; another large quantity from Donala, three to four miles; although in the bed of Dabatwali Khud there was shingle available and when Bikapur Aqueduct (R. D. 53,319) was constructed shingle was obtained from Dabatwali. It was said that the shingle in Dabatwali Khud was not suitable for R. C. C. work and had, therefore, to be obtained from elsewhere; but considering the quantities obtained from other sources, this explanation does not sound very convincing.

7.8. When we came to consider the matter of lining, we were faced with the same series of contradictions in the matter of leads. For the head reaches of the Nangal Hydel Channel it was expected that shingle would be obtainable from the spoil within a mile or two of the work. Also there was a crusher working at Nangal and it was thought that shingle would be supplied from there. Actually, however, very small quantity of shingle was obtained from the spoil only in one reach (R. D. 500—9,500) and the remaining quantity came from other sources. We are willing to accept that it was not found profitable to screen shingle from the spoil but the non-procurement of shingle for the head reaches from the Nangal crusher is not so easily understood. The Superintending Engineer stated that very little material was obtainable from the crusher. The curious fact, however, is that although for the reach down to R. D. 15,000, no shingle was obtained from the Nangal crusher for the next reach R. D. 15,000 to R. D. 25,500, when the distance from the crusher had become three miles, nearly 13,000 c. ft. was obtained from the same crusher, and still more curious that for the reach further lower down (R. D. 42,000 to 47,250) a quantity of 18,000 c. ft. was carried from the crusher over a distance of eight miles and still lower (R. D. 47,250 to R. D. 52,000) a quantity of about 800 c. ft. was carried from the same crusher to a distance of nine miles.

7.9. Shingle for lining was obtainable in the Donala Khud R. D. 36,586 but in the particular reach concerned, i.e. between the R. D. 25,000 and R. D. 42,000 when the distance from the Donala Khud was only a mile or two miles, shingle was still brought from the river, a distance of five miles to six miles, and also from Brahmpur (R. D. 19,393), a distance of three to four miles.

7.10. For the canal reach R. D. 47,250 to R. D. 52,000 supplies were available from Dabatwali (R. D. 46,390) ; but a good deal of supply was brought again from the river over a distance of five to six miles, while for the work in the next reach R. D. 52,000 to R. D. 58,500, when the Dabatwali Khud was at a longer distance a considerable quantity of shingle was taken from Dabatwali and a large quantity (3,82,552 c. ft.) from Donala Khud, a distance of six miles. In the next reach (R. D. 58,500 to R. D. 59,700) an amazing thing seems to have happened; the entire quantity of shingle for that was taken from Brahmpur—a distance of ten miles while the apparent sources nearer it, i.e. Donala Khud and Dabatwali Khud—were ignored. A similar thing happened in the next reach (R. D. 59,765 to R. D. 60,998), where again nearly the entire quantity was taken from Brahmpur, a distance of ten miles.

7.11. The pattern of leads for the supply of boulders is similar. When the syphon at Charanganga (R. D. 65,934) was built, a large quantity of boulders was obtained from Donala Khud—eight to nine miles away, but when the Donala Aqueduct (R. D. 36,586) was being constructed, boulders were taken not from Donala but from the Brahmpur Khud—four miles distance. Similarly for the Jhinjri Aqueduct (R. D. 81,263) some boulders were brought from Nakian, some from Mehndwan. For the Nakian Syphon, however, the supplies were obtained from Lohand, five to six miles away and supply was also carried from Lotan Khud, about ten miles distance, although Lohand was the source of supply of boulders on a large scale for distant works on the Bhakra Main Line. For the Mansoli Syphon (R. D. 1,73,733) boulders were obtained from the Sirsa quarry and similarly for the Chandpur Drainage Syphon (R.D. 1,78,894) boulders were obtained from a quarry in the bed of the Sirsa, a distance of about 6—8 miles. When however, the Sirsa Aqueduct was constructed boulders were obtained from a quarry in Chiknikhud—a distance of twelve miles and some supply came from a quarry away from Nalagarh, a distance of eighteen miles.

7.12. Several explanations are offered. It is said that the material in the nearest quarries had at times been exhausted in supplying other works, that the material in the nearest quarry was sometimes not suitable and that the shortest distance to the nearest quarry was not always workable. Had the sort of thing we have mentioned happened once or twice, we might have been inclined to accept these explanations; but the frequency with which the supplies appear to have been brought from far and distant places show that there was no proper planning in this respect and whatever planning was done, it was not actually given effect to. Discussing this matter with us, the Superintending Engineer admitted that better planning does seem to have been possible. He maintained, however, that in fact the various quantities of material were actually brought from the places entered in the measurement books and there has been no dishonesty in this respect. This may be so, but we have no doubt that in the matter of these leads the subordinate staff and the contractors were so much left to their own resources that considerable confusion prevailed and a good deal of unnecessary expenditure was incurred. We have compared the various leads allowed in the first plan prepared by Shri B. R. Lamba, and in the note prepared by Shri A. C. Malhotra, with our own inspection of the sites, and we find that on the whole, our impression corresponds fairly closely to the leads recommended by the two Superintending Engineers and we feel, therefore, that we are right in thinking that the longer leads that have been actually paid for and the expenditure incurred on them could have been avoided if more systematic planning had been done and adhered to. We have prepared a chart as well as statements showing the location of the works, the leads actually paid to the contractors and the leads which should have been reasonably allowed from the nearest source as checked by us (*vide* Appendix I, Annexures 3, 4 and 5). We have then worked out the financial implication of the longer leads in respect of the cross-drainage works from R. D. 12,189 to R. D. 57,662 and in respect of the lining from R. D. 0 to R. D. 58,500 in which the payments as worked out by us have been indicated. *The total excess payment in respect of supply of shingle comes to Rs 2,72,000 and in respect of supply of boulders to Rs 28,000 and the total, therefore, is Rs 3,00,000.*

CHAPTER VIII

BHAKRA MAIN LINE

8.1. The Bhakra Main Line starts at Rugar and ends at Tohana, a distance of about 108 miles. It is a lined canal with full supply depth of 19' at head and 18' at tail and bed width of 87' at head and 48' at tail. The total expenditure (direct charges) on this canal comes to Rs 1,111.76 lacs and is made up of three main items:—

General particulars and nature of scrutiny conducted
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	<i>Rs in lacs</i>
(1) Earthwork ..	314.57
(2) Lining ..	380.00
(3) Cross-drainage and masonry works ..	125.08

We examined the lining work in its general aspects and also certain reaches in some detail. Regarding cross-drainage works we picked out five of the largest and had a detailed analysis of all of them prepared. Regarding excavation we started with an abstract of the estimated quantities prepared and compared it with the actual quantities that had been paid for and we found large excesses. To eliminate the possibility that the estimates may have been over tight we decided to pick out a few reaches of the canal and framed independent estimates. For this purpose, we had fresh levels taken with the help of the staff and fresh cross-sections prepared. We found on the whole that our estimate of the quantities of earthwork accorded largely with the estimates as originally framed and, speaking generally, we are satisfied that the excess cannot be attributed to faulty estimates. Our analysis of these chosen reaches gave us a closer picture of the actual excesses ; but did not furnish any real clue to the cause for such excesses. We found, however, that the excesses were widespread and not confined to a particular part of the canal. To obtain a yet closer picture we decided to have two fairly large reaches further analysed into as small bits as possible and in respect of these two reaches (R. D. 24,000 to R.D. 34,000 and R. D. 3,80,000 to R. D. 4,60,000) we had two very detailed statements prepared indicating the quantities executed and paid for from time to time. We thought that each small portion of a particular reach will have been allotted to a particular contractor and if we could ascertain the total amount of work done in that part of the reach, we might find out the cause of the excess. The detailed statement, however, revealed that in the course of excavation, work orders had been issued for overlapping portions of each reach and the measurements had been made in respect of overlapping reaches. We knew, of course, that under the work order system, a particular contractor was under no obligation to finish the work allotted to him in a particular reach and we were, therefore, prepared to find two or more contractors working at different times in the same portion of a particular reach. We were not, however, prepared for what we actually found, namely, that when a particular contractor left and a new contractor came on the scene that new contractor was allotted not the identical portion or the reach which had been previously allotted to another contractor, but a smaller or a bigger portion of the same reach. Thus we found that while one contractor was

allotted the reach from R. D. 24,500 to R. D. 24,700, the second Contractor was allotted the reach R. D. 24,545 to R. D. 24,700 and the third contractor R. D. 24,700 to R. D. 25,000. Similarly in the other reach, one contractor had worked in the portion R. D. 3,80,000 to R. D. 3,81,500, and the second in the portion, R.D. 3,80,000 to R. D. 3,83,000, while the third from R. D. 3,81,000 to R. D. 3,83,000, a fourth from R. D. 3,80,000, to R. D. 3,85,000, yet another one R. D. 3,82,000 to R. D. 3,83,000. These are mere illustrations. The resulting confusion makes it virtually impossible for any one to lay his finger on the exact spot where the excess actually occurred, although of course, it is clear that excesses have occurred in particular reaches. In this state of affairs, the only alternative for us was to place the entire matter of these excesses before the engineers responsible for the work and to obtain all possible explanations from them. This we have done.

8.2. To begin with, the explanations were in most general terms which could not assist us in attributing any particular part of the excess to a specific cause. Later on the officer attempted to furnish more detailed explanations which we shall deal with. We wish to observe at this stage that the manner in which the excavation work has proceeded shows lack of order which cannot be explained by the mere speed. We cannot find any reason why it was not possible to split up the canal into small portions of manageable lengths and allot such portions to separate contractors and insist on each contractor finishing that work before he was allotted any other portion of the canal. This would have ensured orderly progress and coherent record of work. Instead of this, contractors appear to have been allowed to go from place to place doing such work as was presumably easy, with the result that difficult reaches were left incomplete.

8.3. For the reach R. D. 24,000 to R. D. 34,000—a length of two miles—the estimated quantity of earthwork was 3,15,17,000 c. ft. Against this payment has actually been made for earthwork to the extent of 3,79,91,000 c. ft., thus showing excess of 64,74,000 c. ft. which is approximately 20 per cent. It is stated that out of this, a quantity of about 31 lac c. ft. is attributable to silt clearance, due to rain deposits. When we compare this figure with the silt clearance involved in other reaches, we find the quantity suspiciously large. In the neighbouring reach R.D.0 to R. D. 24,000, which is more than double the size of this reach, the total silt due to rain deposits is 4 lac c. ft., and in another neighbouring reach R. D. 34,000 to R. D. 38,000 again it is about 4 lac c. ft. In the next reach R. D. 38,000 to R. D. 83,000—a length of 45,000 feet or about nine miles—the total rain deposits came to only 10,66,000 c. ft., and in none of the other reaches of the canal has there been recorded such a large quantity of rain deposits as in the reach in question. It has been stated that there were special circumstances as a torrent virtually flowed into the canal during the rainy season of 1951, but even so, the reason is not convincing enough. Assuming, however, that the official record is correct and the total work involved in this operation is accepted as recorded, i. e., 30 lac c. ft., there remains a balance of about 34 lac c. ft. of earthwork unaccounted for. One reason mentioned is that the work was done by a large number of contractors leading to numerous separate measurements and small difference in depths led to over-measurement. This may be one of the causes. It seems to us on the whole, that there has been over-measurement to the extent of 34 lac c. ft.

Reach R. D. 24,000 to 34,000—Excessive quantity paid for.

8.4. We have examined a portion of the reach R. D. 2,00,000 to R. D. 2,02,000 in considerable detail. The estimated earthwork according to our first information was 20,85,000 c. ft., but the Overseer concerned stated before us that the correct figure was 22,57,000 c. ft. Actual payment has been made for 26,00,000 c. ft. of earthwork, not including kassi work which comes to another

Reach R. D. 2,00,000 to
R.D. 2,02,000—Avoidable
excess in quantity.

3,19,000 c. ft. The explanation for this excess of 3,50,000 c. ft. in excavation alone is said to be a decision taken rather late to change a part of the alignment which resulted in shifting the canal about 2,000 feet to the left. This decision was taken after over 2,50,000 c. ft. of earthwork had already been done, so that some more work in the form of rehandling had to be done when the old excavated bed had to be filled up again. Over and above this error, it appears that due to inordinate haste, a somewhat wasteful procedure was adopted in the course of excavation. The Overseer states that the outside of the bank was first completed. It was found that for purposes of compaction more earth was required from borrow-pits and as no suitable land for borrow-pits close enough to the canal was available, it was decided to cut down a part of the already formed bank and obtain earth for compaction, and the part of the bank, which was thus cut down, was later reformed with the earth obtained from lip-cutting. The waste involved is obvious. It is clear that if the work had been planned more carefully and no change in the alignment were made, nearly 3,50,000 c. ft. of earthwork could have been saved.

8.5. The next reach examined is R. D. 2,35,000 to R. D. 2,37,000 which reveals an excess of about 2,00,000 c. ft. of earthwork. Out of this

Reach R. D. 2,35,000 to
R. D. 2,37,000.

about one lac c. ft. is attributed to silt clearance ; about 45,000 c. ft. is attributed to the construction of the dowel, and about 52,000 c. ft. to extra earthwork necessary for filling *gharras* on account of damage done to the bank by rain. This is said to have been done after the silt clearance work had been completed. We are inclined to accept these explanations.

8.6. Going back now to the general picture of earthwork over the entire canal, we find that the earlier estimate for earthwork was of the order of 68 crores c. ft. This was possibly a rough estimate and in April, 1951, the Superintending Engineer informed the Chief Engineer that the total quantity of earthwork would come to 70.28 crore c. ft. When the detailed estimates were worked out the actual figures came to 74,14,47,000 c. ft. The actual quantities of earthwork paid for are 83,53,05,000 c. ft. There is thus an excess of 9,38,56,000 c. ft. of earthwork.

Excavation Bhakra Main
Line—Excessive quantity
paid for and its cost.

8.7. A part of this excess is attributed to silt clearance due to rain deposits and the high figure involved is explained by stating that the excavation work was carried over five rainy seasons. The total quantity of silt clearance comes to 1,14,66,000 c. ft.

8.8. It has been pointed out that in the measurement book there is no record of any silt clearance or rain deposits below R. D. 2,50,000 although some silt clearance must have been done in that part of the canal also, i. e., between R. D. 2,50,000 to R. D. 5,40,000. It is true that towards the tail of the canal rainfall is scanty but there can be no doubt that some deposit due to rain must have occurred even in this part of the canal and it appears that the Overseer concerned instead of recording that separately as silt clearance or rain deposit, mixed it up with ordinary earthwork. We are, in these circumstances, inclined to believe that approximately two crore c. ft. of earthwork in all may have been involved in this operation. There still remains an excess of 7,38,00,000 c. ft. of earthwork.

8.9. Another general reason mentioned, in connection with this excess, is that the earthwork done by machinery has been over-measured, the reason being that the staff in charge of the machines merely calculated

the earthwork by multiplying the number of hours the machines remained under operation by the estimated outturn per hour. The total work said to have been done by machinery comes to only 92,54,000 c. ft. and even if we were to reduce it to two-thirds it will only explain an excess of about 30,00,000 c. ft. of earthwork and 7,00,00,000 c. ft. of earthwork will still need to be explained.

8.10. The next reason is stated to be the non-provision in the estimate for making dowels at the top of the canal banks. This was particularly mentioned by the Overseer in charge of R. D. 2,35,000 to 2,37,000 who stated that about 45,000 c. ft. of earthwork was needed for the construction of the dowel. If this estimate is correct the total extra earthwork required will come to more than a crore c. ft. This reduces the excess to 6.00 crores. It has been claimed that some excess was caused by the non-provision in the estimates for lip-cutting below the natural surface level. It is clear, however, that this should not make any difference to the quantity of earthwork although, of course, it might make a difference to the cost and while considering the excess in quantities, therefore, this reason has to be ignored. Finally, it was stated that the work was done by different contractors at different times and in measurements a slight increase in the depth of the borrow-pits on each occasion had the cumulative effect of considerably increasing the measured quantities. This is really another way of admitting that the measurements were not made as carefully as required and also involves an assumption that if the work had been done more efficiently and in more orderly manner, there might have been no over-measurements. We have tried to make as big an allowance for the excesses that can be attributed to justifiable causes and on consideration are led to the conclusion that there have been unexplained excess to the extent of about 4 to 5 crores c. ft. of earthwork. The Superintending Engineer, who succeeded Shri R. R. Handa, namely, Shri L. S. Gupta, stated before us that there had certainly been over-measurements in respect of earthwork although it was difficult to fix individual responsibility in this matter. He added that during construction it was known that the estimated quantities of earthwork were being exceeded at most places, but as the full extent of these excesses was not known, no revised estimates were prepared. These admissions point to the extreme confusion that seems to have prevailed. The work was proceeding at break-neck speed and the subordinate staff may have indulged in overpayments because no prompt check was being exercised.

8.11. The average rate for excavation over the entire canal has been worked out at Rs 29-11-0 per thousand c. ft. *The excess payment due to excess in quantity will come to Rs 12 to 15 lacs.*

8.12. Two miles below its head, the Bhakra Main Line crosses a nadi, named Sugrao, and a super-passage has been constructed there costing Rs 19,28,655. In time of Sugrao Super-passage. flood this nadi carries a discharge of 42,000 cusecs. On the left bank of the nadi a marginal bund has been constructed. When we were investigating the cost of this work, some of our staff went over the marginal bund and noticed that it was not of the stated length and consequently they proceeded to measure it. The bund was supposed to be 10,000 feet long, but on measurement it was actually found only 8,944 feet in length. One of us then inspected the site to verify the facts. It appeared incredible that any subordinate officer could have signed the completion plan for this work certifying the completion of 10,000 feet long bund, which was considerably shorter and we, therefore, asked the Superintending Engineer in charge (Shri B. S. Talwani) to visit the site and investigate the facts. He did so and sent us a report clearly showing that the bund had not been constructed as shown in the completion plan and that the contractor had been paid for work which he had never done. When he discussed the matter with us verbally, he stated that beyond the bund a thick jungle was standing on the ground and it was, therefore, apparent that even the site for the full length of the bund had not been cleared. His conclusion was that "there was no doubt that excess payment of earthwork

seems to have been made which was of the order of 7 to 8 thousand rupees," and he added that "action was being taken against the person concerned". We thought it proper, therefore, to report this matter immediately to the Anti-Corruption Department and we did so with the suggestion that further detailed investigation should be initiated. We believe that this is being done. Since then we have heard that on some of the jungle being cleared, some remnants of a part of the bund have been discovered and the vague suggestion now made is that the bund was possibly constructed to the correct length but a part of it, which is now missing, had been washed away by the floods. We are far from convinced and we find ample support from two significant circumstances. Firstly, we have little doubt that if any part of this bund was actually damaged by the flood, a report to that effect would have been made and the quantity of earthwork washed away would have been determined in due course and replaced. We have not been told that any such report exists.

8.13. Secondly, we find it impossible to believe that when the matter was taken up by the Superintending Engineer in the presence of the subordinates, who were concerned with this work, he should have been shown the alleged remnants of the bund which are now said to have been discovered and we have no doubt that the Overseer and the Sub-Divisional Officer concerned would have cried hoarse that the site of the washed away part of the bund should be more carefully inspected before the Superintending Engineer was allowed to form the impression that the bund had never been built beyond the length of 8,944 feet. Over and above these circumstances, it is extremely difficult to believe that any flood could have so sliced off the whole length of one thousand feet of this bund so as to leave no apparent sign of it visible on the site. *The amount of money involved in this blatant act of dishonesty is not much, being approximately Rs 7 to 8 thousand, but the daring manner in which it has been done has perturbed us considerably and we feel that unless the subordinates concerned were fairly certain that no superior officer was going to inspect this work, soon after its construction, they would not have taken such a risk.* It is a measure of the slackness of supervision that the subordinates were led to count upon due to general confusion prevailing at that time.

8.14. The notice inviting tenders for this big work was published on the 4th of March, 1951, and the date for opening the tenders was fixed as 26th of March, 1951, thus allowing only 22 days' publicity; while the departmental rule is that a minimum of thirty days' notice should be given. This is a small matter and we would not have adverted to it, but for the unfortunate fact that we have found a consistent breach of this rule all over and we have not come across more than one instance where this rule of thirty days' notice may have been observed. Thirty days is the minimum period prescribed by the rule. It has been stated that the Executive Engineers were short of time, but it is hard to believe that a few days this side or that side could have made such a vital difference as to justify a wholesale breach of the rule. The fact appears to be as is indeed admitted by some of the officers that in the Irrigation Branch and largely due to the work order system, outside contractors, i.e., those who are not continuously working in the same circle, hardly ever come in to compete and the officers have, therefore, taken it for granted, that wide-scale publicity is not helpful and have not, therefore, thought it necessary to allow much time for submission of tenders. We do not think that this is a very healthy practice as we have noticed that at places where wide publicity was ensured, competition among contractors was keener than elsewhere and rates do fall with competition and it is, in our opinion, wise to observe the rule of 30 days' minimum publicity, so that as many contractors as feel interested in the work may have time to form their estimates and put in their tenders. In this particular case, only five tenders were received. The lowest was accepted. The work started in September, 1951, and was completed in June, 1952, within a period of nine months, which is indeed creditable. We noticed, however, that although the final measurements were recorded in the measurement

book on 1st July, 1951, and more than four years had elapsed at the time of our investigation, the accounts had not been closed, one reason being that the contractor had already been overpaid to a small extent, i.e., Rs 568 and the final bill is in the form of a minus bill in which, of course, the contractor has no interest.

We noticed that the accounts have not been kept with meticulous care and an examination of the Register of Works revealed that entries were being made in it right down to June, 1956, although the work had been completed four years earlier. These recent entries are said to be in the nature of adjustments ; but it has not been always easy to understand their true import.

8.15. Looking into the matter of supervision, we discovered that although the Sub-Divisional Officer was required by rule to check-measure 35 per cent of the value of the work, he had actually been able to do only to the extent of about 16 per cent. More distressing is the fact that some of the check-measurements recorded by the Sub-Divisional Officer seem to have been mere copies of the record of the Overseer, for although these sets of measurements are supposed to be independent of each other, we discovered that those recorded by the Sub-Divisional Officer tallied in a number of instances with those recorded by the Overseer, even up to six significant figures. The conclusion is irresistible that independent measurements had not really been taken. It is possible that the Sub-Divisional Officer did not have sufficient time, but even that would not justify the cooking up of record in this manner.

8.16. We found an excess of about 4,38,000 c. ft. in the earthwork excavated for the foundations, the total quantity involved being of the order of 42 lac c. ft. It was stated in explanation that the data collected for the design was meagre in the sense that levels of the ground were observed only at a few points and as the bed of the torrent varies in levels, more earthwork was required to be done than originally estimated and also that some earthwork like ramps, not contemplated at the time of the estimate, had to be done. Considering the feasibility of the explanation and the quantities involved, we have accepted the explanation.

8.17. We find that during excavation, wet earthwork which carries an allowance, was paid for a part of the work nearly 4' above the spring level, as the spring level was originally stated to be. Here again, it is said that at the time of the construction, the spring level had risen and payments were made in accordance with the actual conditions at site. The amount involved in this payment is small and we have chosen to believe the statements of the officers concerned.

8.18. Slush work carries an allowance of Rs 8 to Rs 16 per thousand c. ft., and when we looked at the geological formation of the ground (*vide* Appendix I, annexure 6), we found that if pumping was going on efficiently, no slush need have been formed above a certain level, because the earth structure comprises only sand and pebbles. The departmental officers, however, say that irrespective of the actual formation of slush, as slush is ordinarily understood, an allowance for the work under water has necessarily to be paid ; because this work is more difficult than ordinary wet earthwork and in fact, the extra rate for gravel work under water is separately mentioned in the schedule and is Rs 16 corresponding to the maximum of the slush allowance. This argument involves a slight confusion in terminology ; but as we are willing to agree that this kind of work is more difficult than wet earthwork, we have decided not to question the extra payment.

8.19. A quantity of 1,19,028 c. ft. of sand was taken to the site of the work in connection with concrete. This was said to have been obtained from the river Sutlej—a distance of four miles. We found from the record that during construction samples of sand used were tested for fineness modulus. The results indicate that these varied from 1.3 to 1.5 in four out of five cases

which means the mostly fine sand was being used. Fine sand is apparently available in the bed of the Sugrao and a suspicion naturally arose that the contractor may well have used local sand and merely obtained payment for river sand with its carriage over four miles. We, therefore, obtained samples of sand from the Sutlej from the same neighbourhood as the sand for this work was said to have been procured and also took samples of Sugrao sand. We had those samples tested for fineness modulus in the research laboratory at Nangal. The results show that in respect of coarseness, river sand in that neighbourhood does not substantially differ from sand found in the Sugrao. We have been told, however, that Sutlej river sand was used although it was just as fine as Sugrao sand because the latter was not clear enough and a good deal of organic matter was found mixed into it. We suspect the explanation is an afterthought and only local sand was actually used.

8.20. A large quantity of boulders—nearly 5 lac c. ft.—was obtained for this work. It seems to have been intended originally to obtain the boulders from the bed of the Sirsa Nadi about 14 miles away. Actually, however, boulders are said to have been obtained from far distant places—26 to 32 miles away. The bulk of the supply came from the bed of Lohund Nadi, while a small supply came from Nalagarh which is not so far away. In explanation it has been stated that no quantity of suitable boulders was available in the Sirsa and that at Nalagarh too the supply was limited against the very large demand for boulders not only in connection with this work but several other works which were going on at the same time including some works by the Buildings and Roads Branch. When one of us visited Nalagarh during the investigation, it was found that there were sources of supply available in that neighbourhood which had not been tapped. The fact that boulders were actually carried from Lohund, rests largely on the statement of the contractor for carriage and considering the degree of supervision that was being exercised, it does not seem at all improbable to us that the contractor obtained most of the supply from Nalagarh and its neighbourhood and merely charged the rate from Lohund. We have found on the record a letter written by a Sub-Divisional Officer, Shri Bhagat Ram, working on the Nangal Hydel Channel, saying that he had visited Nalagarh for procuring boulders in March, 1952, and that the supply had already been exhausted in connection with big works on the Bhakra Main Line. We also feel that if the supply of boulders had been properly organised, a good deal of money could have been saved.

8.21. For the supply of boulders said to have been procured from Lohund carriage has been paid for 32 miles for a quantity of 7,25,413 c. ft., and for 30 miles for a small quantity of 36,240 c. ft. Carriage rates in the Irrigation Branch are a little on the liberal side and every addition to the lead involves extra expenditure. Now the Lohund crosses the Nangal Hydel Channel at R. D. 1,06,619, its tail being at R. D. 2,01,110, so that the distance of the Lohund crossing from the tail of the Nangal Hydel Channel is a little over 18 miles. Bhakra Main Line begins at the tail of the Nangal Hydel Channel and Sugrao Super-passage is just two miles below it. This makes a distance of a little over 20 miles—say in all 21 miles between the Lohund crossing and the Sugrao Super-passage. It is said that suitable boulders could not be found in the immediate neighbourhood of the Lohund crossing and the contractors had to go some distance upstream to find them. Further it is said that during construction there was no bridge over the Sirsa Nadi and trucks had to go through the bed over a circuitous course and since these two facts would not explain the entire lead it was said that there was no proper boundary road along the Bhakra Main Line and there again the trucks had to follow a circuitous route. The last fact is not borne out by the evidence before us and Shri R. R. Handa as well as Shri L. S. Gupta have stated that there was a boundary road all along the Bhakra Main Line Canal soon after construction started. We have made every allowance for a distance of four to five miles upstream of the Lohund crossing and working on the liberal side, we feel that no lead longer than 29 miles should have been allowed for the carriage of boulders to Lohund, and we have worked out the excess at the rates mentioned in the schedule and we find that an overpayment

of about Rs 27,000 has been made in connection with this item. We similarly find that the lead for boulders obtained from Nalagarh has been over-measured and the proper lead paid for should have been 21 miles against 25 and 26 miles. The quantities involved are, however, small. In all, according to our calculation a total sum of Rs 27,600 appears to have been overpaid.

8.22. The next big torrent crossing the Bhakra Main Line is Budki at R. D. 20,412. The canal is here carried over an aqueduct costing nearly Rs 23,00,000. Tenders for this work were called on the 27th May, 1952, and received on the 16th June, 1952. The lowest tender was by Messrs. Mohinder Singh-Gowardhan Singh who quoted 11.1 per cent below the basic schedule of rates. This tender was, however, rejected on the ground that the contractors had enclosed with it only a cheque on the Punjab National Bank Limited as earnest money instead of a proper treasury challan and in the result the next tender of Shri Sita Ram at 9.5 per cent below the schedule was accepted. *The difference between the two rates involved a sum of about Rs 22,000 and considering this, it appears to us that the reason for not accepting the lowest tender was a little too technical and if a suggestion had been made to Mohinder Singh-Gowardhan Singh to deposit the earnest money in proper form, they might well have complied and there was nothing in the rules prohibiting the Executive Engineer from negotiating this matter with the contractor.*

8.23. The work started in July, 1952, and it was completed in April, 1954. The Register of Works, however, shows that entries continued to be made right down to April, 1956, which, we understand, were in the nature of adjustments. A large quantity of boulders was obtained for this work, namely, 11,33,573 c. ft. Out of this, the bulk of supply, i.e., 10,57,334 c. ft. was obtained from Lohund Khud which is the farthest away from the work and while from the other two sources of supply only small quantities, viz., 38,600 c. ft. in one case and 37,639 c. ft. in the other, were received. It appears to us that if this matter of procuring boulders had been properly planned, there might have been no difficulty in obtaining the supply in good time from nearer sources and we have, as in the case of the Sugrao Super-passage, acute suspicion that these boulders were procured by the contractor from the nearest source, and only the longer lead was charged. Leaving that matter alone, we find that the lead actually allowed for the supply from Lohund Khud, namely 34 miles, was not justified and the proper distance, according to our opinion would be 29 miles as allowed in the case of Sugrao Super-passage plus another two miles, being the distance between that work and the present, total 31 miles. The overpayment in this connection works out as :—

	Rs
10,57,334 c. ft. at Rs 3-12-0 per cent c. ft. (difference between a lead of 34 miles as against 31 miles)	39,650

8.24. There has been an excess in earthwork for the foundations. The Sub-Divisional Officer concerned has explained that over and above the provision in the estimate, a good deal of earthwork had been done.

- (1) A small ring bund was built when the work was started in July, 1952, but after the flood season, another ring bund had to be constructed.
- (2) The height of the guide bund was raised by about 3' over the previous height.
- (3) A water tank had to be placed over an earthen platform.
- (4) Four ramps were built to allow trucks to travel.

Apart from these, there was, we understand, shortage of sleepers for shuttering and the officers, therefore, resorted to earth-centring in the form of compacted earth and when these had to be removed, excavation rate was

paid instead of merely rehandling. Further, in connection with the aprons, the ground levels assumed had been lower than actually found on the side of the torrent and more digging was, therefore, involved. We have, in view of the explanation, accepted the excess as justified.

8.25. There was in connection with well sinking for the foundation some excess payment made and some of the excess has been ordered to be recovered by the Chief Engineer. The matter is, however, still in dispute as the contractor appears to have put in additional claim and we gather that no final decision has yet been arrived at. It is, in the circumstances, not possible to say what excess payment, if any, will actually have been made.

8.26. The next work we have examined is Siswan Super-passage at R. D. 38,630. The project provision 1949-50 for this work was Rs 13,87,000.

Siswan Super-passage. It was later raised in the Project of 1955 to Rs 23 lacs. On the basis of the detailed sanctioned estimate, however, a provision was made for expenditure of Rs 22,58,908. The actual expenditure works out as Rs 21,34,411.

8.27. Tenders for this work were called on 16th June, 1952, almost the same time as for Budki Aqueduct which is only a short distance from there. The lowest tender was by Mohinder Singh at 9 per cent below the schedule. The second lowest was by Nidhan Singh-Durga Dass at Rs 8-4-0 per cent below the schedule and the third lowest by Chander Bhan-Har Bhagwan at 5-7 per cent below the schedule. The lowest two tenders were, however, rejected; Mohinder Singh's, because he was considered too small a contractor and that of Nidhan Singh-Durga Dass because their antecedents were not known and it was doubtful if they could successfully undertake the work. *It is clear that if the work had been allotted to the lowest tenderer, a good deal of money of the order of Rs 74,000 might have been saved.* The plain fact that another contractor had at that very time agreed to do the work in the same neighbourhood at 9-5 per cent below the schedule also appears to have been overlooked. We do not wish to fetter the discretion of responsible officers charged with the duty of executing big and difficult works, who must be left to choose the contractors, according to their best judgement, but it is equally clear that arbitrary exercise of discretion tends to lower the sense of responsibility and it is advisable, therefore, that when a tender appreciably higher than any other actually received is to be accepted, convincing reasons for the action exist.

8.28. Quite early in our investigation of this work we decided to check the quantity of stone that had gone to fill the apron and one of us (Shri P. C. Agrawal) got an area on the left upstream guide bank exposed and the stones actually found were taken out and measured. The result was astounding. Against the expected quantity of 1,433 c. ft. in the exposed area only 637 c. ft. was found, revealing a shortage of 796 c. ft., and it appeared at that stage that the quantity of stone paid for was more than double the actual quantity used. We asked the Superintending Engineer (Shri B. S. Talwani) to join us in the investigation. The Sub-Divisional Officer who was also present, represented that much of the stone must have been washed away by the floods. We could find no sign of this on the site, but since the result of the first observation was much too startling, the Superintending Engineer suggested that a similar experiment be made on the opposite bank, i.e., the right bank of the torrent where the apron did not seem to have come into action at all. This was done in the presence of the Superintending Engineer and again a shortage, which was not of the same magnitude as in the first case, was noticed. We worked out the shortage as 31 per cent, but Shri B. S. Talwani differed and his calculation showed that the shortage was only to the extent of 26 per cent and to avoid any argument we have accepted his method of calculation.

8.29. To be further clear in our mind as to what kind of dishonesty had taken place, we decided to have another observation made downstream of the crossing and Shri P. C. Agrawal personally took measurements once again 400 feet downstream along the right guide bund and there too he found

shortage of 50 per cent. We decided then to discard the result of the first experiment and working on the remaining two, we found an average shortage of $37\frac{1}{2}$ per cent in the stone said to have been used for the apron. The total quantity of boulders actually paid for is of the order of 540,354 c. ft. and $37\frac{1}{2}$ per cent of it would mean 2,02,633 c. ft. and including the cost of carriage the price per hundred c. ft. comes to Rs 57 and thus the contractor has been overpaid to the extent of Rs 1,15,000.

8.30. We discussed this matter at some length with the Superintending Engineer and he later sent us a note. We find ourselves in general agreement with his views that a substantial quantity of stone for the supply of which the contractor had been paid was never received at site and although the estimate of that quantity made by the Superintending Engineer is a little different from ours, there is no doubt that the quantity paid for is much in excess of the quantity received for the work and *there has been resulting loss to the extent of Rs 1,15,000*. This particular case we have also reported to the Anti-Corruption Department for further detailed investigation.

8.31. The Register of Works in this case also is as untidy as in the other cases and entries have been made which the staff were not wholly able to explain. The total quantity of earthwork involved in the foundations was 49,46,000 c. ft. and it appears, as admitted by the Sub-Divisional Officer that kankar allowance has been paid on the bulk of this quantity, 48,80,000 c. ft. and in respect of some of the work, slush allowance has been paid over and above kankar allowance. To satisfy ourselves if the kankar allowance was paid within reasonable limits, we had boring done at a place 360' downstream of the bridge (*vide* Appendix I, Annexure 7). We found that there was practically no admixture of shingle in the soil. We had then another experiment made nearer to the site and that revealed that going down to a depth of 26' the only strata in which there was admixture of shingle beyond the accepted limit of 10 per cent was between depth of 6 to 13'. Thus, the percentage of shingle was :—



0' to 6'	.. $2\frac{1}{2}$ per cent
6' to 13'	.. 12 per cent
13' to $16\frac{1}{2}$ '	.. Clay
$16\frac{1}{2}$ ' to 23'	.. 4 per cent
23' to 26'	.. 4.6 per cent

If we accept the result of this experiment, it means that, properly speaking, kankar allowance was admissible only on a small portion of the entire earthwork nearly 13.5 per cent of the total which in terms of money would mean about Rs 2,800, while the allowance paid comes to Rs 27,000. Making some further allowance in this respect, *we feel that an overpayment of Rs 20,000 has been made.*

8.32. As in the case of the previous two works boulders were in this work also obtained mostly from the Lohand Khud, involving a lead of 37 miles, which actually, in our opinion, comes to 3 miles less. The quantity of boulders that came from the Lohand Khud was 8,69,315 c. ft. The difference in rate between the proper lead and the lead paid is Rs 3-12-0 per cent c. ft. and *the excess payment, therefore, comes to Rs 32,000.*

8.33. Shingle was obtained for purposes of cement concrete from the Majri quarries situated right opposite, i.e. R. D. 0 of the Bhakra Main Line on the left bank and its distance thus from the Siswan crossing is a little short of eight miles. Actually, however, a lead of 10 miles has been paid for the carriage of shingle. The explanation offered in this connection is that trucks had to go along a circuitous route. We have found in evidence that a perfectly feasible road along the canal boundary was available and

no payment over and above eight miles lead need have been made. The quantity of shingle thus obtained was 3,63,290 c. ft. and the difference in rate of carriage between the two leads is Rs 2-2-0 per cent c. ft. *Thus an excess payment allowing for the rebate to the contractor comes to Rs 7,000.*

8.34. The quantity of shingle used on this work comes to 5,86,467 c. ft. ; while the actual quantity issued to this work is admitted to be 5,98,658 c. ft. The Sub-Divisional Officer, Shri Dev Parkash, has admitted that about 12,000 c. ft. of shingle was wasted, the explanation being that this was caused by washing shingle and rehandling it a number of times. This is acceptable.

8.35. Two cross-drainage works about a mile apart from each other were constructed for the passage of the water of the Ghaggar river, i.e., the Ghaggar Spillway Syphon at R. D. 4,50,135 and the Ghaggar Aqueduct at R. D. 4,60,796. The first has cost Rs 18,88,890 as against the estimated expense of Rs 17,88,708 and the second Rs 18,23,439 against the estimate of Rs 17,28,541. The two works are connected and it is convenient to consider them together.

**Ghaggar Spill Syphon and
Ghaggar Aqueduct.**

8.36. For the Spillway Syphon, tenders were invited on the 21st September, 1951, and received on the 12th October, 1951, there being five tenders in all and each of them higher than the basic schedule of rates. These tenders were all rejected. On the 25th October, 1951, fresh tenders were called. Only three were received and the lowest was by Messrs Har-Bhagwan-Som Nath, who quoted at the Basic Schedule of Rates. This tender was accepted. For the Ghaggar Aqueduct tenders were called in February, 1952, but not for the entire work but only for five piers. The reason mentioned is that the estimate for the super-structure and even the design was not at that time ready. These tenders were opened on the 14th of March, 1952. Again, only three contractors tendered for this work. It is admitted that no outside publicity was made and the notice of tender was circulated only within the Circle. Again, the lowest tenderer quoted the Basic Schedule of Rates without any rebate. The Executive Engineer at the time, Shri J.R. Tandon, states in his explanation for the omission to give wide publicity that he had found from previous experience that no outside contractor was interested in the work at this place and when earlier a good deal of publicity had been given to the tender notice for the Ghaggar Spillway Syphon, no outside contractor had come forward, and he, therefore, considered it unnecessary to indulge in publicity. The lowest tender, being at the basic schedule of rates, was accepted for the construction of the five piers. We find evidence in the tender register that for certain smaller works in that Division, the rates offered were 2 to 6 per cent below the schedule and we also find that in other Divisions of the Circle the rate had fallen subsequent to the year 1951, and as low a rate as 11 per cent below the schedule had been quoted in respect of big cross-drainage works. We feel, in the circumstances, that if proper and wide publicity had been given for the work of the Ghaggar Aqueduct, lower rate than the Basic Schedule might well have been obtained.

8.37. The work on the Ghaggar Spillway Syphon and piers of the Ghaggar Aqueduct started thus at the basic schedule of rates. The work of the super-structure of the Ghaggar Aqueduct was taken up about a year later, but curiously enough no tenders were then called. The Executive Engineer was Shri P. S. Sagoo and when we questioned him about this omission, he stated that he had found from experience that no contractor was willing to offer anything lower than the basic schedule and that for the tail regulator at Tohana, about 18 miles away, and also for a Skew Bridge near the Ghaggar Aqueduct, the contractors had with the exception of one or two, quoted the same rates as appear in the schedule and in these circumstances, he thought it inadvisable to call fresh tenders for the super-structure of the Ghaggar Aqueduct and decided on the other hand, to let the contractor, who was already constructing the piers, continue the work at the previous rate. Again, we find that as rates were showing a tendency to

fall, this decision to entirely do away with tenders for this big work concerning the super-structure was unhappy and it is clear that if even a small rebate of 2 to 3 per cent had been obtained a substantial amount in the neighbourhood of Rs 20 to 25 thousand would have been saved. We agree that it was convenient to let the contractor already working at the site continue with the work but this convenience alone should not have weighed so much as to do away with the need of calling fresh tenders to see if lower rates could be obtained and in all the circumstances, we feel that a favour was shown to the contractor in letting him do the work at the basic schedule of rates.

8.38. More favours were to come. The Contractor Harbhagwan-Som Nath had quoted the scheduled rates for all the items including carriage of material. It appears, however, that subsequently they began to complain of the carriage rate in respect of boulders, bajri and sand, which materials were being taken from Tohana to the site of the work. The Executive Engineer was consequently persuaded that the rate mentioned in the schedule for carriage of boulders, bajri and sand was not sufficiently profitable, compared to the actual cost, and he, therefore, decided to call fresh tenders for the carriage of these materials. Shri Sagoo states that when he called these tenders the first time all contractors quoted 40 per cent higher than the schedule and he had to reject all of them. In December, 1952, he decided to call fresh tenders for these items only and the contractors then quoted 25 per cent higher than the schedule for carriage of stone, 20 per cent higher than the schedule for carriage of bajri, and 10 per cent over the schedule for carriage of sand. The lowest tender was of the same contractor who was already doing the work, namely Harbhagwan-Som Nath. The Executive Engineer says he persuaded these contractors to accept slightly lower rates, i.e., 15 per cent above the schedule for carriage of stone, 10 per cent above the schedule for carriage of bajri and sand, and having done this, he sent his recommendation to the Superintending Engineer, who in turn forwarded it to the Chief Engineer that these rates be approved. We have gone through the entire correspondence that passed between the officers in this connection and we find from the reading of this correspondence that the impression given by the Executive Engineer was that till then carriage of stone and bajri etc., was being done by Government trucks, that the cost of such carriage was excessive and was working out as 45 per cent above the schedule of rates and it had, therefore, become necessary to invite tenders from contractors for this work, so that Government might not lose unnecessary money and that three contractors had tendered for this work and the lowest tender was by Harbhagwan-Som Nath. It was in this form that the recommendation of the Executive Engineer reached the Superintending Engineer and later the Chief Engineer and we are not surprised that the recommendation was accepted and the higher rates sanctioned. Two important facts were omitted. The first was that Harbhagwan-Som Nath had been doing this work at the Schedule rates and the second that they had originally tendered for this work at the scheduled rate and the entire work of constructing the Ghaggar Aqueduct had been let to them according to their tender, but they had refused to do this particular item of work. We feel that if these facts had been clearly stated in that form the Superintending Engineer or the Chief Engineer might well have considered the possibility of calling fresh tenders. We have had occasion to remark elsewhere that the rates for carriage of material appearing in the schedule of rates are a little on the liberal side and this is the only instance coming to our notice, where a rate higher than the schedule has been allowed for this kind of work. It is said that the road between Tohana and the site of work was kacha and rough and Shri J. R. Tandon, who was Executive Engineer in this Division before Shri P. S. Sagoo, has explained that half a dozen Government trucks working on this road had become unserviceable within a period of one year. We are not impressed by the argument that this work of carriage done by Government trucks was costing considerably more than the scheduled rate and considering the rates there seems no clear reason why this should have been so, unless the running of trucks was not methodically arranged and the expense incurred not carefully supervised. These

contractors had actually been doing this very work at the scheduled rates and we cannot believe that they had been losing in the process. In these circumstances, we think that unusual favour was shown to the contractors in raising the rates, and our impression is firm that the approval of the higher officers was obtained by suppressing important facts.

8.39. The recommendation of the Executive Engineer was sent up on the 30th of December, 1952, and actual sanction was accorded on the 21st of July, 1953. In the meanwhile, and with effect from the 30th December, 1952, the contractors were paid higher rates in anticipation of sanction. *The difference between the higher rate and the tendered rate for the work done during the period December, 1952, to July, 1953, alone comes to nearly Rs 50,000, and for this overpayment, in any case, we can find no justification at all.*

8.40. The excavation of the foundations for these works appears to have presented some difficulty and although the contractors had agreed to work at the scheduled rates they later demanded higher rates, like pick and jumper rates, and decisions about classification of earthwork were made somewhat erratically. Work started first on the Spillway Syphon as the Executive Engineer was anxious that the foundation should be dug up before the rainy season. Actually, however, he found that not much progress could be made and the contractor's labour began to run away. Another contractor was tried, but without success and ultimately the work was handed over to the same contractor who had agreed to do the masonry work. Even, he did not make much progress. The Sub-Divisional Officer then recommended that jumper rate should be provided for most of the work. While, however, the excavation work was continued, payments at the ordinary earthwork rate with hardness allowance were made in nine running bills. In the meantime, the recommendation made to the Superintending Engineer that jumper rate be allowed was accepted and in the 10th running bill payments were made at jumper rate for the whole work.

8.41. Regarding the Ghaggar Aqueduct nearly 11,00,000 c. ft. of earthwork was first entered in the measurement book and actually paid as ordinary earthwork with hardness. In the 14th running bill, it was changed to jumper work, but when the final bill was prepared, being the 19th bill, the classification was again changed to ordinary earthwork with hardness and we are not sure whether this will be the final payment or whether the contractor will make some additional claim.

8.42. Shingle supplied for this work was screened on receipt at site, and as supply of material includes the cost of screening, we wanted to find out why screening was done after receipt. We are told that this fresh screening became necessary because the Research Department insisted on a certain grading of shingle, while the screening done by the supplier was only concerned with eliminating larger sizes. The cost incurred in the re-screening of material was unnecessary expense which could have been avoided if originally the supplier had been told the precise grades of shingle required which perhaps needed a good deal of fore thought than could be expected in the rush of work. We have, therefore, overlooked the extra expense.

CHAPTER IX

NARWANA BRANCH

9.1. The Narwana Branch takes off the Bhakra Main Line at R.D. 1,58,230 carrying a discharge of 4,500 cusecs at the head and after running 64 miles it passes the bulk of the supply into the Sirsa Branch of the Western Jumna Canal, which is now intended to be fed from Bhakra water, so that the water from the Jumna can be used elsewhere. On the way, a few small channels take off the Narwana Branch. This canal is lined throughout its length and it has a bed width of 42.5 feet at head and 21.5' at tail and a full supply depth of 16 feet throughout.

Particulars.

9.2. In the Project Report, 1949-50, it was proposed to construct the Narwana Branch by April, 1954, but in the next Project estimate of 1951, this date was put back to April, 1956. Subsequently, however, and particularly after Shri R. R. Handa took over as Chief Engineer, Bhakra Canals, the completion of the Narwana Branch was again advanced to April, 1954, so that it could be opened along with the other canals in the summer of that year. These vacillating decisions delayed the opening of the Narwana Circle till October, 1951, and the work of excavation did not start till the beginning of 1952. Even after the Circle was opened, the Superintending Engineer in charge (Shri K. R. Sharma) remained under the impression that the canal was to be finished by 1955-56 and it was only towards September, 1952, that he became fully aware that it was to be completed much earlier. He appears to have protested but the Chief Engineer was adamant and according to Shri K. R. Sharma's evidence before us, he threatened to give him a bad report in case the work was delayed. The official correspondence shows that in December, 1952, the Chief Engineer formally and firmly wrote to the Superintending Engineer that the canal had to be completed by April, 1954. He said in this letter:—

“ I impressed upon you during the discussion that to expect you to complete the Narwana Branch by April, 1954, was not a task which was new to the Department. The Haveli Main Line was completed in one year and ten months from the date of the opening of the Divisions. In your case to ask you to complete the Narwana Branch by April, 1954, is to allow you two years and six months. If you need additional establishment, you were asked to submit your proposal to me during my next visit to Jullundur. I have to write this because I find that even in the address of the Secretary, Running Canals, to the Institute of the Civil Engineers, he mentioned May, 1955, as the expected date of completion of the Narwana Branch. I do not understand the source from which he got this information. The intention of this letter is to dispel all such ideas, if they exist, even after my discussion with you at Jullundur.”

In reply to this, the Superintending Engineer wrote a lengthy letter pointing out his difficulties, but agreeing, in the circumstances, to try his best to complete the canal by the target date. He pointedly referred to the speed at which the work would have to be done and said—

“ According to the normal speed of the work as mentioned in statement II, 22 divisions were required to complete the Narwana Branch at a speed of works of Rs 25 lakhs per year. The actual number of divisions available up to March, 1955, on the Narwana Branch as shown in statement I works out to be only 9. If the Narwana Branch was to be completed and run in 1954, at a normal speed of working the divisions, this Circle should have been opened in 1948. There has been wrong planning on the part of the then officers. We are now required to make up for the bad planning in the past and also to work at a very abnormal speed. The officers and staff in this Circle are striving hard with full confidence within them with breakneck speed to complete the

Narwana Branch and the Bist Doab Canal as desired by you in April, 1954, and run it at the same time."

And at another place in the same letter he said:—

"I agree that expectation to complete the work on the Narwana Branch by September, 1954, is not a task which is new to the Department, but it is very abnormal. We will certainly strive hard to show better progress than that shown in the case of Haveli canals, and also to complete the Narwana Branch by 1954."

The Superintending Engineer has stated before us that he was keenly conscious of the risk involved in such speedy construction and equally conscious that the staff available to him was not of that calibre which he would have desired because the pick of the staff had already been used up in other construction circles and he had to be with what was left over.

9.3. The work of lining the Narwana Branch started only in 1953, and was completed by April, 1954, within one season and large number of headings had to be started simultaneously. At the same time, most of the cross-drainage works were constructed during the same one season. In all the circumstances, therefore, the completion of this work by the summer of 1954, has been no mean achievement. Along with this, however, we have to state the fact that some of the worst muddles and scandals have arisen in connection with the Narwana Branch, which we have had necessarily to go into. Some of these we have dealt with separately in connection with the purchase of stores.

9.4. Before actual excavation of the canal started, it was found necessary to cut down the trees standing in the way and to uproot the stumps

Uprooting of stumps—Excessive numbers paid for.

and in some estimates for the excavation of the canal, provision for uprooting the stumps was made. Actually, however, even before this, some of the subordinate staff had started paying contractors for uprooting the stumps. This is indeed a scheduled item, carrying a rate of Re 1 per stump but we gather from the evidence before us that this item has rarely appeared separately and in any case, the cost involved in this kind of work has not usually been large. On the Narwana Branch, however, and particularly in the Kaithal Division, the number of stumps said to have been removed and paid for mounted so high that the Executive Engineer (Shri J. S. Gill) was very much surprised when the facts came to his notice. He says in his evidence:—

"It was in connection with this excavation that I first came to know that there was such an item being actually paid for as uprooting of stumps. Formerly, I had done construction work only on the Sidhwan Branch and no payments had been made for any such work there. In former construction works this item was not paid separately. The actual estimate for excavation, etc., in the division had not been prepared when these payments started being made in the division. When the details of these payments came to my notice, *I felt that the number of stumps appeared excessive*".

What he says later is even more interesting :—

"This matter came to my notice in connection with the sale of stumps that had been uprooted and which had to be credited to that account. I did not approve the sale and told the Sub-Divisional Officer that I would check the number. Later, however, it appeared that the stumps uprooted had already been used by the labour who had no other fuel and *the sale that had been made was largely fictitious*. What had happened was that the contractor who had to be paid for uprooting the stumps was not paid in full rate. This matter was also brought to the notice of the Superintending Engineer and the Superintending Engineer finally ordered that a Sub-Divisional Officer would be sent to decide this question of stumps. By the time, however, the Sub-Divisional Officer arrived, it started raining and the whole

contryside was flooded with water and no check could be made by him. Subsequently, during Winter of 1953, we got this matter properly checked by the Sub-Divisional Officer himself. The Sub-Divisional Officer who made the payment and the Overseer were transferred from the division”.

9.5. It is quite clear, thus, by the time suspicion began to arise about the number of stumps said to have been uprooted and the Executive Engineer thought it proper to look into the matter, the evidence susceptible of verification was no longer in existence. The sale under which the price of the stumps was credited to Government was a mere fiction. The Executive Engineer agrees that the number of stumps said to have been removed was suspiciously large. We have collected figures for the stumps removed and paid for and we find that while on the average there are said to have been only 31 stumps in a length of 1,000 ft. of the canal in the Upper Division of the Narwana Branch, the average of such stumps found in the lower, i. e. the Kaithal Division comes to 561. In respect of the Kaithal Division, we have had the entire area of banjar land, included in canal boundary, worked out from the acquisition files, as it is on banjar land that trees in large numbers could be expected and one of us inspected the dhak jungle on the sides of the canal and after counting the number of trees standing in the thickest part of the jungle, calculated that, on an average, there was one tree for every 218 sq. feet of ground. We have made a further deduction and allowed 200 sq. feet of ground per stump and working on that assumption we find that the total number of stumps that could reasonably be found within the canal boundary in the Kaithal Division from R.D. 2,60,000 to the tail of the canal (R.D. 3,19,500) would be about 14,822, while the actual number of stumps that have been paid for in this reach of the canal is 59,459. These figures are, of course, approximate and there is a margin of error in our assumptions, but there is no doubt that the number of stumps said to have been removed is far in excess of the stumps that could have possibly been found on this site and every circumstance, we have come across in this connection, supports that conclusion. *Roughly speaking, therefore, we can say that a sum of about Rs 20,000 has been overpaid.*

9.6. There has been similar excess payment on the removal of stumps on the Saraswati Feeder in the Kaithal Division and again working on similar assumptions we find that about 10,000 stumps have been paid for in excess of the reasonable number. Further we find that in some of the reaches, with no banjar land at all, a large number of stumps are said to have been removed. Thus in the reach R. D. 29,000 to 30,000, 1,984 stumps are said to have been paid for and in the previous reach, R. D. 21,000 to R. D. 22,000, the number is mentioned as 1,157. *There has thus been excess payment of about Rs 5,000 in connection with the stumps on the Saraswati Feeder.*

9.7. For the work of lining it was decided to procure a number of steel tanks for soaking bricks and the Executive Engineer, Rajpura Division, and the Executive Engineer, Kaithal Division, bought a number of them on different occasions. We have worked out the average price paid per cwt. and we find that it works out to about Rs 42. In December, 1952, the Executive Engineer, Kaithal Division, suddenly required 120 more such tanks. He sent letters of enquiry to three firms and called for quotations to reach him virtually within five days, as he was apparently in a hurry. This letter appears to have issued from the office of the Executive Engineer on the 15th December, 1952, while the quotations were required to reach his office by the 20th of December, 1952. Actually, however, without waiting for the 20th December to arrive, the Executive Engineer placed an order for 120 tanks on a firm named V. S. Kumar and Co., on the 18th of December, 1952. Purchases actually made against this order were worth Rs 18,398 and computing the weight of the tanks, it appears that a rate of Rs 68.9 per cwt. was paid on this order as against the normal rate of Rs 42 per cwt. and we gather that subsequent to this purchase, quotations were received from other firms which were considerably lower ; but meanwhile, of course, the tanks had been ordered. *The loss involved was about*

Purchase of soaking tanks— Excessive rate paid.
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Rs 7,000 ; but the haste and hurry in which the order was placed leaves room for doubting the bona fides of the order and there is the added fact that the firm favoured, Messrs. V. S. Kumar and Co., has to our knowledge been concerned with other unsatisfactory transactions in this division.

9.8. The total quantity of excavation for the Narwana Branch was estimated as 26,17,96,000 c. ft. The figures supplied to us by the Circle office show that actual payment has been made for 29,71,51,000 c. ft. of earthwork, showing an excess of 3,53,55,000 c. ft., and even if we allow a margin of 5 per cent for undulations, i. e., about 1,30,00,000 c. ft. of earthwork, there remains an excess of 2,23,55,000 c. ft. The figures for the work actually paid for have, in some instances, been challenged, and, in particular, it has been stated that the work done by machinery on this canal, has been over-measured. We obtained some figures independently from the divisions and, in certain instances, we have found discrepancies between those figures and the figures furnished by the Circle office, the reason apparently being that figures in the official record are being continuously adjusted ever since the work was completed. There is, therefore, some room for error, but for a consideration of the broad picture on the whole, we have accepted the Circle figures.

9.9. The quantity of 29,71,51,000 c. ft. is made up of the following items :—

Classification rather-liberal.		C. ft.
(1) Ordinary earthwork	..	17,96,24,000
(2) Kassi work and rehandling	..	2,64,44,000
(3) Gravel work	..	6,51,000
(4) Pick and Jumper work	..	3,88,54,000
(5) Jumper work	..	2,72,30,000
(6) Jumper work with occasional blasting	..	80,97,000
(7) Ordinary blasting	..	1,11,000
(8) Earthwork by machinery	..	1,21,18,000
(9) Silt removal, etc.	..	31,55,000
(10) Slush work	..	8,67,000
Total	..	29,71,51,000

As against ordinary earthwork 17,96,24,000 c. ft. hardness allowance has been paid on a quantity of 19,55,93,000 c. ft. and it is clear, therefore, that some of the kassi work done in connection with lip-cutting has also earned hardness allowance. Considering that the rate for kassi work plus rehandling is Rs 20 per thousand c. ft. as against the rate of Rs 13 for ordinary excavation, the justification for paying hardness allowance on lip-cutting above the natural surface level, at any rate, is not clear. Precise figures for this kind of lip-cutting have not been furnished and we have not gone into this detail as the amount involved is small. We, however, note the fact that some liberality in this connection has been shown to the contractors. The average rate for earthwork over the entire canal is worked out as Rs 26-9-0 per thousand c. ft. which, considering the shorter lead involved on this canal, is slightly higher than the rate on the Bhakra Main Line.

9.10. When we began looking into individual reaches we found in some of them very large excesses in quantities and it was in connection with these reaches mainly that the officers concerned stated that the figures for the work actually paid for were not reliable.

Excess in quantities.

9.11. We begin with reach R. D. 2,00,000 to R.D. 2,05,000. The estimated earthwork in this reach was 32,81,000 c. ft. The original figures furnished to us showed that actual payment has been made for about 76,00,000 c. ft. of earthwork and this figure has been challenged. We have reason to doubt

Reach R. D. 2,00,000 to 2,05,000—Excessive quantities paid for.

the correctness of this figure as the figures collected later from the Divisional office indicate that the work paid for was 58,38,959 c. ft. and we have, for the purpose of considering the excess cost, accepted this lower figure which coincides with the impression of the Sub-Divisional Officer (Shri Santokh Singh), who stated that the work paid for was of the order of 59,00,000 c. ft. There is, in any case, excess of about 25½ lakh c. ft. of earthwork.

9.12. In explanation, it is stated that an additional length of 800 feet was subsequently included in this reach and had to be excavated and it was too late then to prepare a separate estimate. The quantity involved in this extra reach is said to be 5,00,000 c. ft. It is then stated that there was change in the Longitudinal Section of the canal which accounted for a further quantity of 200,000 c. ft. and further that unevenness of natural surface level accounted for an excess of 50,000 c. ft. This reason has been generally mentioned in connection with other reaches also. Shri Santokh Singh has then stated that when excavation started, it was thought that the earth from the bottom portion would be utilised for compaction and the top earth was, therefore, thrown away; but when digging went down to the bottom, it was suddenly found that it was sandy and that earth could not be used for compaction with the result that 1,50,000 c. ft. of earth had to be obtained from outside. The precise reason for such optimism about unknown facts is not clear and if the facts stated are correct, it means that due to carelessness during construction 1,50,000 c. ft. of earthwork had to be done unnecessarily. The other explanation offered is that a torrent at one time overflowed into the canal and a lot of silt was deposited there; but somehow no separate record of this silt clearance was kept and there is, therefore, no supporting document to corroborate the general statement. In other reaches of the Narwana Branch, we have found silt work separately recorded and there is no reason why if there was any silt deposit in this part of the canal, it should not have been so recorded. In all, this supporting explanation covers only a quantity of 7,50,000 c. ft. and still leaves an excess of 18,00,000 c. ft. of earthwork. This can only be attributed to overmeasurement either deliberate or careless. *The cost at the average rate of Rs 26-9-0 per thousand c.ft. comes to Rs 47,000.*

9.13. In the next reach R. D. 2,05,000 to 2,10,000 there is similar confusion about quantity. The estimated earthwork in this reach was

Reach R. D. 2,05,000 to R.D. 2,10,000—Excessive quantity paid for.

37,09,000 c. ft. According to the figures supplied by the Circle Office, the quantity paid for comes to 58,77,000 c. ft. including 5,87,000 c. ft. of excavation work, done by machinery. Later, when our staff collected the figures from the Divisional record, they found that the quantity paid for, came to nearly 67,77,000 c. ft. and the figure for work by machinery, 12,18,000 c. ft. The discrepancy is in the work done by machinery. We are again willing to accept the lower figure. When the Sub-Divisional Officer-in-charge (Shri Santokh Singh) came to give evidence before us, he stated that according to his calculations the actual excavation came to only 51,31,717 c. ft. Even if we accept this figure, it shows an excess of 14,22,000 c. ft. The only explanation offered by the Sub-Divisional Officer is that an excess of about 2,00,000 c. ft. was caused by a change in the Longitudinal Section. He has added that the figures for the work done by machinery are not reliable, not even the lower figure of 5,87,000 c. ft. After making every kind of allowance it appears to us that overpayment for 12,00,000 c. ft. of earthwork has been made. *The cost of this at the rate of Rs 26-9-0 per thousand c. ft. comes to Rs 32,000.*

9.14. The next reach we examined is from R. D. 2,40,000 to R. D. 245,000. The estimated quantity of earthwork is mentioned as 62,37,000 c. ft. and against this, payment appears to have been made for 83,11,387 c. ft. Shri T. R. Dhir, who was in charge of the work, stated before us, that a revised estimate was actually prepared for this reach showing that the payment had been made to the extent of 77 lac c. ft. We were unable to trace this revised estimate mentioned by this officer. He suggested then that he would prepare a revised estimate for our benefit and he has sent us one. According to this, he has on the basis of revised levels, estimated the total quantity of earthwork involved as 69,24,000 c. ft. but to this he has added another 10 per cent on account of inequalities in levels making a total of 76,16,000 c. ft. The explanation given is that actual work done by manual labour is only to the extent of about 76 lac c. ft. and the balance of the work, said to have been done, was by machinery and that, in fact, the machines were employed only on silt clearance. These explanations are not convincing. To begin with, there seems no reason to add as much as 10 per cent to the quantity, estimated on the basis of correct levels. Further, there seems no reason why against the total estimated quantity, only the quantities executed by manual labour should be counted. The official record clearly mentions that machinery was employed in this reach and did work to the extent of 6.94 lac c. ft. The suggestion that these machines were employed on clearing silt only is not supported by record. It will, therefore, appear that there has been an excess payment in quantity of about 14 lac c. ft. The cost of this works out as Rs 35,000.

9.15. No revised estimate has been sanctioned for the Narwana Branch and the entire record is in a state of confusion, but there is not the slightest doubt that in certain reaches of the canal very excessive payments have been made as illustrated by the instances we have mentioned.

9.16. Going further down the canal, we were able to find more order and more plausible explanations for excesses and we record these to indicate that where explanations did in fact exist, there was no difficulty in bringing them to light while in cases of the reaches we have dealt with so far, the officers seemed to feel helpless, in spite of their anxiety to explain the excesses. At one stage, the Executive Engineer told us that he was getting little, or no assistance, from the subordinates in explaining the excesses.

9.17. We considered the case of reach R. D. 2,60,000 to R. D. 2,64,000. Provision was made in the estimate for a quantity of 29,07,000 c. ft. while actual payment was for 31,33,000 c. ft. but according to the Sub-Divisional Officer, a much less quantity was paid. He was able to explain, however, that there was a tibba found in the way of the canal which had to be cut down, but which was not provided for in the estimate and it involved a quantity of 1,30,173 c. ft. This statement is supported by an entry in the measurement book specifically mentioning the tibba and we have, therefore, accepted the explanation. We notice in this reach that rehandling has been paid for a larger quantity than the quantity for kassi work, but again the explanation is forthcoming that some of the excavation done by machinery was later handled by manual labour and, therefore, more rehandling was paid than kassi work.

9.18. Considering the next two reaches R. D. 2,64,000 to R. D. 2,66,000 and R. D. 2,66,000 to R. D. 2,68,000, we found excesses of the order of 2,00,000 c. ft. in one case and one lac c. ft. in the other, but the Sub-Divisional Officer explained that in both these reaches a drain for supply of water was built by the side of the canal for which originally there was a separate estimate, but later on it was decided to write back the quantity to the estimate for excavation. We are willing to accept this explanation.

9.19. Dealing with the next reach R. D. 2,68,000 to R. D. 2,72,000 we found excess, about 1,36,000 c. ft. but it has been stated in explanation that there was a parallel drain in this reach also which accounted for a quantity of 70,000 c. ft. that there was a tibba above the natural surface level which had to be cut down and which accounted for 45,000 c.ft. and finally that about 1,00,000 c.ft. of earthwork had to be done because the alignment of the canal had been wrongly marked at the spot to begin with and some excavated portion had, therefore, to be filled back. This extra 21,000 c. ft. of earthwork has to be attributed to inefficiency but the cost is so small that we have overlooked the matter particularly because we learn that the Department has already taken notice of this mistake and responsibility has been duly fixed.

9.20. *To sum up, the excess in quantity in the reaches we have investigated comes to 44,00,000 c.ft. involving a cost of Rs 1,14,000.*

9.21. We turn now to the crossdrainage works. Markanda Superpassage at R. D. 23,000 on the Narwana Branch has cost Rs 12,19,785. It was completed within one year. Tenders for this work were called on the 14th August, 1953, and opened on the 29th August, 1953, allowing a period of only fifteen days against the thirty days' minimum prescribed by rules. Eight tenders were received, but the one actually accepted was the fifth lowest at 10.5 per cent below the schedule by Indian Engineering Co. The next lowest was 10.2 per cent below the schedule by Messrs Wazir Chand-Manohar Lal ; the next 8.3 per cent below the schedule by Messrs S. D. Sehgal and Co., the fourth 7.6 per cent below schedule by Messrs Chaman Lal-Satishish Kumar and the fifth and accepted tender was by Sita Ram being 6.7 per cent below the schedule. The Executive Engineer while sending up his recommendation to the Superintending Engineer stated that the Indian Engineering Co. had no experience of this size of work and that they had worked for some time with him on the Sidhwan Branch, but did not give satisfaction ; and that Wazir Chand-Manohar Lal had worked on the Nangal Hydrel Channel in connection with the Nakian Syphon, which they had left unfinished and put in baseless claims. About Messrs S. D. Sehgal and Co., he said that they were busy with the work at the Tangri Syphon and had also taken up some lining work in the other division and were not likely to have sufficient time to attend to this work and about Messrs Chaman Lal-Satish Kumar he said that he had no personal knowledge of their capacity to do this work and they did not appear interested either, as they had not attended his office. In the result he suggested that the work might be allotted to either Messrs S. D. Sehgal and Co. or to Shri Sita Ram, but he preferred the latter, *although it meant a loss of about Rs 4,000* as compared with the lower tenders. The Superintending Engineer accepted this. We wanted to see the original tenders and also the comparative statement prepared at the time, but were told that these documents were not traceable. We recognise the fact that the work concerning the Superpassage was fairly large and the more important fact that it had to be done very quickly, but it does not appear to us that the usual step of picking out a contractor whose tender was nearly at the bottom was taken after such detailed consideration of facts as it deserved and our suspicion is particularly excited by the circumstances that this contractor was picked out for the work of the Neele Regulator on Markanda River near Jalbera also ; although his tender was not the lowest.

9.22. A substantially large quantity of boulder stone was required for this work ; about 3,00,000 c. ft. in all. The story concerning this supply is interesting. Tenders for the supply were first called in July, 1953, and Messrs Dhian Singh-Gurbakhsh Singh offered to supply the entire quantity at Rs 60 per cent c. ft. The work was allotted to them in November, 1953. It is stated, however, that after they had supplied 1,00,000 c.ft. of stone, they

left the work and we take it that the rate was no longer paying. The Sub-Divisional Officer, Shri S. D. Kalra, reported the matter to the Executive Engineer, suggesting that tenders should be called afresh and the Executive Engineer did so. This was in February, 1954. In the meantime, however, a work order for the supply of boulder stone was actually issued in December, 1953, in favour of Sita Ram, contractor, who was doing the masonry work, and he started supplying boulder and actually supplied just about 2,00,000 c. ft. In the work order issued to Shri Sita Ram, no rate was entered and the Sub-Divisional Officer states that running bills were paid at Rs 60 per hundred c. ft., but the understanding was that finally he would be paid the rate which the Superintending Engineer might approve after calling tenders. What it means, in other words, is that the bulk of the supply was obtained from Shri Sita Ram long before tenders were called. However, in February, 1954, tenders were put in by eight persons. Again we find the original document missing. From the tender register and the correspondence, it appears that the lowest tender was by Messrs Hakim Ram and Sons, Delhi, at Rs 65 per hundred c. ft. The next was at Rs 66-8-0, the next Rs 67 and the next by Messrs H. R. Malik and Co. at Rs 67-0-6. Then followed Sethi Supply Co. at Rs 69-14-0 and finally two more—one at Rs 76-14-0 and the other at Rs 77-7-0. There is then a note in the hand of the Executive Engineer which he says is a reproduction of the order of the Superintending Engineer, which reads :—

“The lowest tendered rate of Messrs H. R. Malik and Co. at Rs 67-0-6 is accepted. If they cannot supply the full quantity of stone required for Markanda, the next lowest tender recommended, viz., Sethi Supply Co., Ambala, should supply the stone at Rs 69-14-0 per hundred c. ft. If they also cannot make the full quantity, the contractor doing the Markanda work should also be given a chance to do this work at Rs 69-14-0 per hundred c. ft.”

9.23. The manner in which this order is expressed is surprising. To begin with, Messrs H. R. Malik and Co., were not the lowest tenderers; but leaving that, the obtaining of supplies from the contractor doing the Markanda work is only mentioned as a remote contingency, while the fact is that that contractor was already supplying stone long before then and the bulk of the supply was actually received from him. We cannot help remarking that the order as it is expressed, creates a wholly wrong impression about the true facts and the attempt seems to have been to reach as high a rate as possible so that Shri Sita Ram would for the supply already made by him receive the benefit. In these circumstances, we begin to doubt if H. R. Malik and Co., who had quoted at Rs 67-0-6 per 100 c. ft., were ever allowed to make any supply and it is clear, of course, that the lowest tender was somehow ignored. *This has made a difference of Rs 13,400 in respect of the supply received subsequent to November, 1953, and we believe that this amount could have been saved.*

9.24. *There has been an overpayment of about Rs 2,400 in respect of a small item of rough iron work, an item with which we have dealt with elsewhere and regarding which an excessively high rate happened to be fixed through a mistake in the Chief Engineer's Office. The original rate for rough iron work was Rs 35 per cwt., including the cost of material, but somehow when a separate labour rate for this item was considered it happened to be sanctioned at Rs 30 per cwt., while it should have been in the neighbourhood of Rs 10 per cwt., as the cost of material at that time was Rs 25 per cwt.*

9.25. In view of what had been discovered in respect of the apron at the Siswan Superpassage, we decided to make a similar check of quantity of stone used for the Markanda Superpassage. An area on one of the side slopes was exposed and the stone taken out and measured and where we expected a quantity of 457 c. ft. of stone, we actually found 429 c. ft., the difference being insignificant. This incidentally conforms to our impression that the shortage we found at Siswan could not be attributed to any special method of laying the stone or measuring it.

9.26. One of the big masonry works on the Narwana Branch is the Saraswati Drainage Syphon at R. D. 2,81,465 costing Rs 5,54,890. Tenders were invited for this work on 21st October, 1952, and opened 14 days later on the 4th November, 1952. The lowest tender by Messrs Kishan Chand and Sons was at Rs 11-11-0 per cent below the schedule of rates, but this was not accepted as the contractors were not in the confidence of the Executive Engineer, not being known to him previously. The next lowest tender by Messrs Hans Raj and Co. at Rs 10-9-0 per cent below the schedule was, therefore, accepted. Some of the work orders issued in connection with this work during December, 1952, and April and May, 1953, had not received formal approval of the Executive Engineer even at the time of our inspection. We found a somewhat similar state of affairs in respect of several other work orders and when we questioned the Executive Engineer he could only say that a number of work orders were left in the office when he was transferred suddenly and some of these had not been approved. He then added :—

“Generally speaking, the approval of a work order is a formality.”

We are not convinced and would add that work orders, which are the authority for starting work and making payments, must be attended to within a reasonable time. We found on looking at the Register of Works that it had not been properly posted at all and in most places only the last column had been filled in. This makes the checking of work extremely difficult and we need not repeat that this document is important and should be written up as the work proceeds.

9.27. On reconsidering the quantity of reinforcement used in this work we found that against the estimated quantity of 1,980 cwt., as much as 2,709.62 cwt. had actually been issued. The Sub-Divisional Officer explained to us that in fact 2,025 cwt. of steel bars were actually used on the work and the balance of 685 cwt., was left surplus and was lying at site on completion of the work. To explain the excess quantity of 45 cwt., he stated that even in mass concrete work some steel binders were used in order to make a proper joint as between the work left over and the work begun the next day.

9.28. Regarding the excess quantity carried to site for which needless carriage was apparently paid, it was stated that to begin with the right kind of steel was not available and it was apprehended, therefore, that extra quantity may have to be used and more steel was, therefore, carried to the site, but when later the right kind of steel did become available 685 cwt. was left surplus. It is obvious that some of the steel was carried to the site in a hurry and if the whole thing had been carefully planned the sum involved in carriage of this steel could well have been saved.

9.29. In the sanctioned estimate a provision was made for the carriage of 1,25,330 c. ft. of sand to the site from two sources, namely, a small supply of 29,500 c. ft. from Jagadhri, a distance of about 40 miles and the bulk of supply, i.e., 95,830 c. ft. from the bed of the Sirsa Branch of the Western Jumna Canal with a lead of 10 miles. We find actually that although no sand was brought from Jagadhri, the entire quantity was not obtained from the Sirsa Branch as it should have been and some sand, 52,347 c. ft. in one case and 2,400 c. ft. in the other was brought from Karnal, a distance of 31 miles. The Sub-Divisional Officer admitted, in this connection, that the sand brought from Karnal was no better than the sand available from the Sirsa Branch, but he stated that the entire supply could not be got from the Sirsa Branch because without any apparent warning water was suddenly let into that canal at one time which made it impossible to get any more sand from there for the time being. It is admitted that the entire supply of sand from the Sirsa Branch could have been obtained earlier and, in fact, it appears to us that the entire supply might well have been obtained before the work started. We have

worked out the difference in the cost in respect of the quantity actually carried and we find that Rs 6,600 could have been saved if the supply had been arranged efficiently.

9.30. Regarding the excavation of the foundation we find that the proper quantity involved should have been :—

(1) Excavation	..	12,53,000 c. ft.
(2) Rehandling	..	8,29,615 c. ft.
Total	..	<u>20,82,615 c. ft.</u>

As against this the record of executed work shows :—

(1) Excavation	..	25,95,113 c. ft.
(2) Rehandling	..	18,01,051 c. ft.
Total	..	<u>43,96,164 c. ft.</u>

9.31. On further investigation, however, we found that most of the excavation in this case was done by machinery and no overpayment to the contractor was involved. The Sub-Divisional Officer and the Overseer have explained that when the foundation began to be excavated the contractor for manual labour dug the pit only up to a depth of 5' to 6' and then he found it impossible to go on and, therefore, left. The actual payment for manual work was for 6,10,137 c. ft. A dragline was then put on the job to excavate the earth which was wet and slushy and the operation of rehandling had to be repeated more than once in view of the short boom of the dragline. In these circumstances, we have not troubled to look into further details, as the work done by machinery was not actually measured at site but was only computed from the number of hours that the machines were at work.

9.32. Another work on this canal is the Needle Regulator on the Markanda River near Jalbera, which has cost Rs 5,69,622. Tenders for Needle Regulator on Markanda River. this work were only invited in November, 1953, and actual work did not start till January, 1954. At that time no estimate had been sanctioned and we gathered that the estimate was not sanctioned till some time in 1956. The lowest tender in this case was by one Inder Sain, who quoted 8½ per cent below the schedule of rates although for the supply of stone and shingle he quoted separate rates. It appears, however, that Inder Sain was not acceptable to the Executive Engineer, who reported that he had never done any masonry work in the Department and consequently another contractor, named Sita Ram, was allotted this work at 5 per cent below the Schedule of Rates. If fresh tenders had been called it is possible that a lower rate might have been obtained.

9.33. The estimated quantity of earthwork in the foundation was computed as 21,46,000 c. ft. and this was accepted by the Executive Engineer and approved by the Superintending Engineer. In the office of the Chief Engineer, however, the quantity was somehow reduced to 18,97,000 c. ft. The actual quantity paid for as mentioned in the record is 21,63,162 c. ft. and over and above this there is an item styled 'earthwork re-excavation' totalling 3,73,196 c. ft. The Sub-Divisional Officer explains that in fact excavation proper regarding this work is only of the order of 20,74,000 c. ft. and that the balance of 89,000 c. ft. was in respect of work done for a bund in the river. He has further stated that the orders were to complete this work by May, 1954, but in spite of every effort it could not be done and in the meantime, a flood came on 4th June, 1954, and the excavation pit was filled up with the mud that had to be taken out. The quantity involved at this time was 6,000 c. ft. Thereafter the progress was retarded and by the time the work again started in earnest another flood came in July, 1954. This was so serious that the work for the time being had to be abandoned and when it was to

restart the foundation pit, had to be dug up again and cleared of the mud and silt and work to the extent of 3,73,000 c.ft. had to be done in this connection. This has been called re-excavation. The statement offered in explanation is convincing and we have, therefore, accepted it.

9.34. The next work we have examined is the Tangri Drainage Syphon at R. D. 1,91,790. This work costing Rs 8,42,899 was started in December, 1952, and was completed in March, 1954. Tangri Syphon. Some of the work orders issued by the Sub-Divisional Officer in December, 1952, were not approved and signed by the Executive Engineer till January, 1957, and apparently only when they were called up by us. In the same manner, the Register of Works has not been properly posted apart from the last column. We estimated the quantity of excavation work involved in the foundation and came to the conclusion that it should be round about 19,88,000 c. ft. The sanctioned estimate, however, provided for a quantity of 20,85,272 c. ft. Actual payment seems to have been made for a quantity of 24,43,024 c. ft. and the bulk of this nearly 95 per cent has been paid as jumper work. In explanation it is stated by Shri Man Mohan Singh, Sub-Divisional Officer, that the estimate had not provided for putting in pressure release pipes which meant about 9,000 c. ft. of earthwork; and that when he took charge, he found a good deal of earth from outside had been washed into the pit and the barrels of the syphon and about 93,000 c. ft. of slush had, therefore, to be removed and paid for. He also says that an error in the natural surface level was discovered to the extent of about 9" and that covered about 1,00,000 c. ft. of extra earthwork. Further, he adds that the slope provided for excavation for flared out walls was not ample and had to be increased, which made a difference of about 55,000 c.ft. of earthwork. These explanations cover a total of 2,57,000 cft. which added to our estimated figure, namely, 19,88,000 c.ft. makes a total of 22,45,000 c. ft. and still leaves an excess of about 2,00,000 c.ft. of earthwork largely unexplained and at Rs 33 (Jumper Rate) per thousand c. ft. its cost comes to Rs 6,600.



CHAPTER X

BHAKRA MAIN BRANCH

10.1 The Bhakra Main Branch is a lined channel which runs from Tohana to the Rajasthan border—a distance of about eighty-five miles. Its bed width and full supply depth respectively are 30·1' and 18' at head and 10·5' and 15' at tail. It carries a discharge of 5,055 cusecs at the head out of which it delivers 1,909 cusecs at tail.

Particulars.

10.2. The quantity of earthwork involved in the excavation of this channel was first estimated as 30,11,60,000 c. ft. and later revised to 32,84,72,000 c. ft., but the quantity actually paid for was of the order of 36,13,77,000 c. ft. so that it is about 10 per cent in excess of the revised estimate.

Excavating Bhakra Main Branch—Quantities and Classification.
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10.3. Out of the total quantity, a little less than half, i.e., 16,90,63,000 c. ft. has been paid at the basic rate while the balance of 19,23,14,000 c. ft. has earned a higher rate either in the form of an allowance like hardness allowance, kankar allowance, or wetness allowance, or in the form of a higher classification, like Pick and Jumper or Jumper work. Fortunately, no blasting rate is said to have been paid for, in this work. It is convenient to consider the matter of quantities first. We have analysed in detail some of the estimates while we have considered the others broadly.

10.4. For the entire length of this canal, 13 estimates were prepared each of them including a fairly large reach. When the time for execution came, these larger reaches had to be split up into smaller reaches and it frequently happened that a single estimate was operated upon by several Sub-Divisional Officers and Overseers. There has been an excess of quantity in the case of every estimate. A part of these excesses was inevitable as some necessary items of work had been overlooked in the original estimates, but there are other excesses not susceptible of such clear explanations.

10.5. One estimate we have looked into details concerns reach R. D. 26,337 to R. D. 68,000. Karam Singh, Sub-Divisional Officer, who was responsible for the excavation in this reach, has stated that one small part of this reach, i.e., R. D. 26,337 to R. D. 27,000 was actually in charge of another Sub-Divisional Officer, and further that below R. D. 55,000 the work was in charge of a third Sub-Divisional Officer and to add to this there was a yet fourth Sub-Divisional Officer in charge of the Earthmoving Sub-Division, who also did some work in this reach. Shri Karam Singh has added that between February, 1953 to June, 1954, there were four transfers of Sub-Divisional Officers in this reach.

Reach R. D. 26,337— R. D. 68,000.

10.6. The figures of earthwork done in this reach are given below:—

Excessive quantities paid.

Total earthwork as estimated	.. 3,00,80,000 c. ft.
Quantity actually paid for	.. 3,92,09,000 c. ft.
Excess over the estimate	.. 91,29,000 c. ft.

Satisfactory explanations for three items are forthcoming. The first concerns an extra cutting in order to accommodate the thickness of the lining of 0·44' which had apparently been overlooked in the estimate. This has been worked out as 2,11,000 c. ft. Some extra kassi work was also involved in lip-cutting above the natural surface level which again was not provided in the estimate and this has been worked out as 14,34,000 c. ft. Thirdly, the

estimate did not provide for any extra work required for compaction and the Chief Engineer subsequently allowed 10 per cent extra earthwork for compaction in the filling reach. The quantity on this account comes to 5,42,000 c. ft., the total quantity being 21,87,000 c. ft.

10.7. The balance of excess quantity still remaining unexplained is considerable. We questioned Shri Karam Singh, Sub-Divisional Officer, in this respect. He stated that he had no specific explanation for these excesses to offer but generally he referred to three factors, which in his view were probably responsible for these excesses. He stated that before excavation started, a large number of earth mounds had to be removed and no provision for this work had been made in the estimate. That there must have been some earth mounds here and there, we do not doubt, but the precise quantity of earthwork involved in the removal of such mounds remains a matter of conjecture, there being no clear and separate record for this work. Apart from this, as the Sub-Divisional Officer has himself admitted, if these mounds were found in a filling reach, there would have been some saving in the earthwork over the estimate and only in the cutting reach would the mounds involve extra earthwork. One aspect of this matter, however, has attracted our attention and it concerns the method of removal and measurement of this particular work. The officer concerned has stated that no cross-sections concerning these mounds were prepared before the mounds were removed. The method adopted was to scrap all the earth forming these mounds and stack the entire earth on the side of the canal and then measure the stack. The only check was supervision or check-measurement by the Sub-Divisional Officer, but it is obvious that in view of the method adopted, any such check could not possibly be effective.

10.8. Another reason for the excesses mentioned is deviation in levels revealed during excavation, the suggestion being that the original levels taken were, at places, inaccurate. Again, there is no clear record to support this allegation although we admit that some excesses may have occurred due to undulation in the levels in between actual points where levels were actually observed and this factor we are prepared to take into consideration. Shri Karam Singh has then explained how excesses due to faulty method of work occurred. He says that this particular reach had been originally reserved for machinery. Later on, when the work started and compaction of banks had to be done, the necessary equipment was not available. In order, therefore, to avoid keeping the labour idle, it was decided to form the outer portion of the banks straightaway before excavating the inner portion. The result was that earth was taken from the borrow-pits to form the outer portion and subsequently when the digging started in the bed of the canal, a good deal of earth was found surplus. It had been intended to use this excavated earth from bed for forming the banks, but a part of them had been formed from the borrow-pits, the result being that a good deal of earth was sheer wasted. Considering everything, we were in some doubt whether this kind of thing was allowed to happen, but the Sub-Divisional Officer was very clear in his mind.

He says :—

“ It was found that the earth which became available on excavating the inner portion will become surplus and that had to be thrown away. The wastage was due to the inexperience of the staff employed in the reach. They did not take the trouble of ascertaining as to how much earth would be available from inside. I am quite sure of these facts. ”

His own estimate is that six to seven lac cubic feet of earthwork was thus wasted. Another officer has also added and he is supported by several others that:—

“ Actually, the work concerning lip-cutting was much more than designed and more than it was necessary. The reason being that a wider portion of the bank than was necessary was

allowed to be compacted, and the consequence was that more lip-cutting than the designed $1\frac{1}{2}$ ' had to be done. The basic cause apparently was that no profiles were prepared due to rush of work and for that reason a wider portion of the bank than necessary was compacted."

The general impression created by the evidence of the Sub-Divisional Officer is that there was a lot of confusion during the excavation of this work and no proper control over the work was being kept, and it is not surprising that a good deal of unnecessary work was done and paid for. We have accepted that 21,87,000 c. ft. of earthwork had to be done over and above the original estimated quantity. We are also prepared to allow another quantity equivalent to 5 per cent of the whole as due to difference in levels and such miscellaneous items as silt removal and flood damage. Actually, the figures supplied to us by the Superintending Engineer show that a record of flood damage and consequent silt removal was being kept, but we discovered that the quantities mentioned in the official records are individually small and we have, therefore, allowed some extra quantity. This 5 per cent allowance for various items would mean in all 15,40,000 c. ft. The remaining excess, i.e. 91,29,000 minus (21,87,000 c. ft. plus 15,40,000 c. ft.) is 54,00,000 c. ft.

10.9. It has been insisted on by some of the officers that the compaction allowance sanctioned by the Chief Engineer, namely, 10 per cent of quantity involved, is at places too low, the argument being that the natural ground from which earth was obtained was not found compact enough for purposes of lining as insisted upon by the Research staff and additional compaction had to be done and, therefore, more earth used. We would prefer to depend, in this connection, on the judgement of the Chief Engineers who have considered this matter in detail, but even if we were to allow some quantity on this head, it would not in this particular reach exceed 4,00,000 c.ft., and in the result a clear balance of fifty lac c.ft. of earthwork would remain as unexplained excess. We can only attribute it to partly overmeasurement, which may have been deliberate in some cases, and partly to wasteful method of work. Overmeasurement, even deliberate, is to a large extent admitted. In fact, it has been repeatedly stated before us that one general cause of excess in quantity was that Overseers on the whole were inclined to be liberal in their measurements in order to show favour to the contractors and that since the Sub-Divisional Officers checked only 35 per cent of their work, the remaining 65 per cent escaped detection and considerable excesses were caused. This explanation, of course, does not explain anything except inadequacy of control and the basic fact of overmeasurement remains. We are fairly clear in our minds that 50,00,000 c.ft. of earthwork would not have been paid for in this reach, if the work had been properly done. The average rate for earthwork in this particular reach was worked out to Rs 24/10. We are willing to take the average rate for the channel which is in the neighbourhood of Rs 20 a thousand cubic feet and the cost of 50,00,000 c. ft. of earthwork comes to Rs 1,00,000.

10.10. Apart from the matter of this excess quantity, there has been in this reach one avoidable payment due to avoidable work. This concerns rehandling of 24,48,000 c. ft. which handling, we think, was never required to be done. What happened was that a pilot channel was dug up along the canal for supplying water for compaction of lining work. This pilot channel was ordered to be made within the base width of the left bank of the canal in the filling reaches, the intention being that the earth needed for forming it would go to make up a part of the bank itself. This is, of course, a correct decision. This particular reach was mostly a filling reach and some earth had to be taken from borrowpits. The normal course would have been to obtain the particular quantity of earth for filling the pilot channel from the borrowpits only when the filling was to be done. Actually, however, the borrowpits were dug up earlier and the earth obtained from them was put down in the form of a heap close to the canal or on canal bank and later rehandled for the purpose of filling the pilot channel. Besides, rehandling of about $13\frac{1}{2}$ lacs c.ft. is said to have

Excessive quantity paid.	rehandling
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been done due to lip-cutting of thickness of more than $1\frac{1}{2}'$. Such work involved unnecessary extra rehandling, the cost of which comes to Rs 25,000 at the rate of about Rs 10 per thousand c.ft. *The total excess expenditure in this thus comes to Rs 1,25,000, which is considerable as compared to the total expenditure involved, i.e., Rs 13,53,000.*

10.11. Another reach we examined was from R.D. 1,00,000 to R.D. 1,30,000 for which the figures are:—

Reach R.D. 1,00,000— 1,30,000.

Original estimate	.. 2,00,06,000 c. ft.
Revised estimate	.. 2,36,87,000 c. ft.

Actually there seems to have been an error in these calculations and we have gone through the calculations and found that the correct quantity on the basis of the revised levels as should have been in the revised estimate comes to 2,16,86,000 c.ft. The actual quantity paid for is 2,28,21,000 c.ft., there being an excess of 11,35,000 c.ft. It has been stated that out of this 1,09,000 c.ft. of earthwork was done in connection with the silt removal and we have accepted this figure so that the excess is reduced to 10,26,000 c.ft. The Sub-Divisional Officer concerned, Shri Harkishan Lal, states that the Chief Engineer allowed only 10 per cent for compaction while at times much more earth than 10 per cent was required and he claimed that about 20 per cent compaction allowance should be allowed. Assuming this to be correct, it would explain an excess of 4,16,000 c.ft. No explanation for the remaining excess has been offered and none seems available so that the balance of 6,10,000 c.ft. of earthwork must be attributed to overmeasurement or some kind of negligence during execution. The cost of this, at approximately Rs 20 per thousand c.ft. is Rs 12,000.

10.12. Again in this reach 11,71,000 c.ft. of earthwork was rehandled on account of filling of the pilot channel and again we find that this—

Excessive rehandling quantity paid.
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 was an avoidable work as earth from these borrowpits should have been directly taken to the pilot channel and the borrowpits should have been laid only when the filling was required to be done.
The unnecessary expense involved in this work comes to Rs 10,000.

10.13. One regrettable fact has to be noted. The banks of the canal as they existed at the time of our investigation were admittedly not up to the standard at certain portions and earthwork approximately valued at Rs 8,000 had to be done to bring them to the standard. Another fact is, that there has, in this reach, been a simultaneous payment of hardness and kankar allowance to some extent. The overpayment involved being only Rs 2,000.

Portions of banks not up to the standards.

10.14. *To sum up, therefore, we would say that in this reach there has been an excess expenditure of Rs 24,000 which is not so much as compared to the total expenditure of Rs 6,72,000.*

10.15. The next reach we have dealt with is R. D. 3,13,000 to R. D. 3,47,000. The relevant figures of earthwork are as follows:—

Reach R.D. 3,13,000— R.D. 3,47,000—Excessive quantity paid.

	c. ft.
Estimated quantity	.. 1,73,06,000
Actual quantity paid for	.. 2,22,32,000
Excess	.. 49,26,000

It has been stated that some excess earthwork became inevitable because of undulations in the levels of the ground, and also partly due to silt clearance which had not been correctly recorded in the official records, and considering the whole matter, we have agreed to give an allowance of 5 per cent of the total quantity on this head, i.e., undulations in levels, etc. Some excess earthwork was also caused due to 10 per cent allowance for compaction and change of site of regulator from R. D. 3,10,000 to 3,18,000. These explain excess to the extent of 18,34,000 c.ft. The net excess would thus be 30,92,000 c.ft. We have examined Shri Harkishan Lal, Sub-Divisional Officer, in respect of this excess and all he has been able to say is that the compaction allowance of 10 per cent as allowed by the Chief Engineer was inadequate and that this allowance at the rate of 20 per cent should have been allowed. We have even made this allowance and find that the quantity of earthwork allowance on this account would be 5,72,000 c.ft. There would thus remain a balance of 25,20,000 c.ft. of earthwork, as excessive work. No further explanation has been offered and all that Shri Harkishan Lal has stated is that there was a general tendency on the part of the overseers to overmeasure the work which tendency could not be checked thoroughly as the Sub-Divisional Officers confine their check-measurements to 35 per cent of the work. This statement offered in explanation is really an admission that overmeasurement was largely responsible for the excess quantity that has been paid for. *We thus hold that 25,20,000 c.ft. of earthwork costing at the rate of Rs 20 per thousand c.ft. was responsible for the excess expenditure of Rs 50,400.* The total expenditure incurred on this reach is Rs 5,02,000 and the excess expenditure, therefore, works out as about 10 per cent which is considerable.

10.16. The next estimate for which the quantities have been examined is for the reach R. D. 3,47,000 to R. D. 3,60,000. The quantities are as follows:—

Reach R.D. 3,47,000— 3,60,000.

	c. ft.
Quantity as per original estimate ..	67,13,000
Quantity as per sanctioned revised estimate ..	94,35,000
Quantity as paid for ..	98,90,000
Excess over original estimate ..	31,77,000

Though the excess over the sanctioned revised estimate would only be 27,22,000 c.ft., the revised estimate seems to have been based on the quantity paid for at the time without valid explanations for the full excess. Allowing 5 per cent for undulation in levels and 20 per cent for compaction allowance which would explain an excess 9,73,000 c.ft., *there still remains an excess of 22,04,000 c.ft. unexplained costing Rs 40,000.* Shri Harkishan Lal, Sub-Divisional Officer, has no other explanation for the excess except that the Overseers were raw and inexperienced.

10.17. The next estimate we have looked at is for the reach from R. D. 3,60,000 to R. D. 3,80,000, the figures for which are:—

Reach R.D. 3,60,000— 3,80,000—Excessive quantity paid

	c. ft.
Original estimated quantity ..	1,33,47,000
Sanctioned revised estimated quantity ..	1,45,03,000
Quantity actually paid for ..	1,76,28,000
Excess quantity over original estimate ..	42,81,000

We have in respect of this reach also made the usual deduction of 5 per cent for undulation in levels and in taking that into account and also other items for which acceptable explanations have been offered, we find that 11,51,000 c. ft. of earthwork was legitimately to be done over and above the estimated quantity. This reduces the excess to 31,30,000 c. ft. The Sub-Divisional Officer, Shri Harkishan Lal, stated about this reach that there had been an overmeasurement of earthwork to the extent of 15,00,000 c. ft. and that this has been detected and a minus bill has actually been prepared. The excess in quantities remaining unexplained thus will reduce to 16,30,000 c.ft. The Sub-Divisional Officer claimed 20 per cent compaction allowance as in other cases and this we have agreed to. The quantity involved is 5,74,000 c.ft. so that the excess is further reduced to 10,56,000 c. ft. No further explanation is discoverable in respect of this. *The cost of this will come to, at the rate of Rs 20 per thousand c. ft., Rs 21,000.*

10.18. The figures in respect of the next reach R. D. 3,80,000 to 4,01,000 are as follows:—

Reach R. D. 3,80,000— 4,01,000—Further excessive quantity paid.

	C. ft.
Quantity as per original estimate ..	1,32,60,000
Quantity as per sanctioned revised estimate ..	1,75,37,000
Quantity as paid for ..	1,66,56,000

The revised estimate quantity seems to be based partly on actual quantity paid for at the time without explaining fully the excess that had occurred at the time. The excess over the original estimate is 33,96,000 c. ft. Allowing for 5 per cent undulation in levels, weather action, etc., and 20 per cent for compaction, the excess explained will be only 16,64,000 c.ft., leaving 17,32,000 c.ft. unexplained. *This would cost about Rs 35,000* No satisfactory explanation is offered by the Sub-Divisional Officer for the excess.

10.19. As regards the next and the tail reach R. D. 4,01,000 to 4,49,000, the quantities are as follows:—

Reach R. D. 4,01,000— R. D. 4,49,000.
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	C. ft
Quantity as per original estimate ..	2,41,08,000
Quantity as per sanctioned revised estimate ..	2,93,83,000
Quantity as actually paid for ..	3,33,03,000
Quantity of excess over original estimate ..	91,95,000
Quantity of excess explained—	
20 per cent compaction allowance ..	20,24,000
5 per cent undulation in levels, weather action, etc.	17,95,000
Total ..	38,19,000
Net excess to be explained ..	53,76,000

Shri Harkishan Lal, Sub-Divisional Officer, explained to us, that a minus bill for about 15 lac c. ft. has been prepared on account of overmeasurement. Even after this, *the excess of 38,76,000 c. ft. costing about Rs 75,000* would stand unaccounted for. Another Sub-Divisional Officer, Shri Mohan Lal, connected with this reach, questioned the accuracy of the figure of the total quantity paid for since he said that a number of minus bills had been prepared. Obviously he refers to the minus bill mentioned by Shri Harkishan Lal.

10.20. It is noticed that estimates of value of Rs 1,86,000 have been prepared to bring the banks to the standards for the length of R. D. 1,00,000 to tail showing that in spite of excesses that had occurred, the banks have not been formed to the standard.

Further expenditure involved to bring banks to standard section.

10.21. We have examined the account of the two cross-drainage works, namely, the syphon at R. D. 35,000, Bhakra Main Branch, and another syphon at R. D. 43,000. To take up the first, tenders for a part of this work were called in March, 1953, and the lowest tender at the rate of 2.4 per cent below the schedule of rates was accepted. The work actually done was the excavation of the foundation. For the main work tenders were called in July, 1953, and the lowest one was found to be at 6.28 per cent below the schedule which was accepted. The contractor, Shri Wazir Chand, started the work, but round about March, 1954, it was felt that he would not be able to complete it in time and to expedite the remaining work, a large number of other contractors about thirteen in number, were put on this work for carriage of material and other items and paid for them at the same rate as tendered by Shri Wazir Chand. In the excavation work, there is an excess of 3,62,000 c. ft. of earthwork, but of this, explanation for some of the quantity is forthcoming and there are only two items worth mentioning. A quantity of 81,000 c. ft., of earthwork had to be done because during floods a part of the Ghaggar spilled into the partly excavated pit and the silt that deposited was to be dug out. This could have been avoided if a proper ring bund had been in the first instance built round the pit to exclude the spill as indeed was done subsequently.

10.22. The next item comprises 2,54,000 c. ft. of earth which was taken from the borrowpits and which could have been avoided, if the normal sequence of excavation work had been followed. Normally, the earth excavated from the foundation pit would have been sufficient to form the banks of the canal as well as the filling behind the flared out wall etc., provided, of course, the masonry work had been completed before the canal banks were required to be built. Actually, however, in this case, the work on the syphon went on even after July, 1954, when water was allowed in the canal and it had, therefore, become necessary to complete the canal banks before removing the ring bunds with the result that the earth from the ring bund could not be utilized for forming the banks and other earth had to be found from borrowpits, and at the conclusion of the entire work when the ring bund was no longer required, the earth forming it could not be used anywhere. In the circumstances, of this particular work, it was perhaps necessary to proceed as the engineers on the spot did proceed and we, therefore, say nothing about this extra expenditure involved in 2,54,000 c. ft. of earth.

10.23. We have looked at the rates obtained for cement concrete and reinforced concrete work. We find that the difference in the estimated rate and those actually obtained is not significant.

10.24. There is one item of shuttering work which appears to have been paid at excessive rate. It concerns shuttering for concrete blocks laid on the floor of the syphon. This has been paid for in accordance with the item 2 (b), section XV, of the Basic Schedule of Rates, which item is described as R. C. C. slabs and plain concrete laid at site as coping etc. It does not appear to us that this description has any application to the kind of shuttering that was actually used for the concrete blocks on the syphon floor and when we discussed this matter with the responsible Officers, including Shri R. R. Handa, we found agreement on their part in this respect. The rate actually paid being Rs 36 per 100 sq. feet is apparently excessive, for the kind of work involved. We have come across this item in case of similar works of the Nangal Hydrl.

Excessive rate paid.

Channel also and in that connection, estimated a fair rate of Rs 15 per cent s. ft. There has thus been an extra payment of Rs 21 per 100 s. ft. in this work and the total excess payment in this connection works out as about Rs 10,000. We also noticed a small overpayment of Rs 800 in connection with rough iron work which item has appeared again and again because of the mistaken rate sanctioned by the Chief Engineer at one time. The quality of work done appears to have been satisfactory.

10.25. The pattern presented by the examination of the accounts concerning the syphon at R. D. 43,000 is similar. There has been some excess in earthwork and almost for identical reasons but the extra cost involved is not considerable. In this case also shuttering in respect of concrete blocks for the syphon floor has been paid at the rate of Rs 36 per 100 sq. feet, instead of a reasonable rate of Rs 15 per 100 sq. feet, as worked out by us. The extra payment thus made comes to Rs 13,000. We notice that this excessive rate has not been paid in connection with the big syphon at R. D. 64,050 which confirms our opinion that the lower rate fixed by us is sufficiently reasonable.

10.26. We had in connection with this circle heard that at times Government trucks were standing idle while carriage work was entrusted to contractors on profitable rates. In connection, therefore, with the working of Government trucks departmentally, we picked up the working estimate of the six G. M. C. trucks in the Tohana Division pertaining to the year 1952-53, viz, cost of working these trucks from 1st March, 1952 to the 28th February, 1953. We find that it was anticipated that these trucks will run about 45,000 miles and would, therefore, consume 9,000 gallons of petrol at the rate of 5 miles per gallon. The actual total mileage done by these six trucks is, however, found to be 37,029 while the actual quantity of petrol consumed came to 13,435½ gallons with the average consumption of 2½ miles per gallon which is nearly half the estimated consumption, and almost as much as of a 24-seater Dakota plane. It was stated that the roads in this tract were rough and sandy and the trucks were constantly travelling over short distances. A part of the explanation offered is, however, startling. It is stated that during the previous and the subsequent years the petrol consumption for similar trucks was also less than three miles to a gallon. We are not convinced with the explanation. Only, it looks to us that there has not been strict supervision over petrol leading to the inference that a good part of it may have found its way elsewhere. No log books for these trucks appear to have been kept. At any rate, none could be made available for our inspection in spite of search.

10.27. In the estimate, it was provided that 12 tyres and tubes were required as renewal. Actually, however, 44 tyres and 45 tubes appear to have been purchased during the year in spite of the fact that the mileage done is actually less than that estimated. We also noticed that a large number of these tyres and tubes—24 in all—were purchased in March, 1953, after the estimate was supposed to be closed. It is said in explanation that actually these tyres and tubes should have been charged to another estimate as a separate estimate had been prepared for this purpose but the fact that the purchase of a large number of tyres and tubes was made towards the end of the financial year does not seem to have been very wise.

10.28. A big item of expenditure in connection with the running of these trucks was the cost of overhaul which is stated to be as Rs 42,561, over and above the maintenance of the mechanical staff in the division, the pay-bill of which came to Rs 3,840. These trucks were obtained from disposal at a nominal cost, but even so, the huge expenditure of overhaul during one year has approached Rs 42,561. Figures for the cost of running per mile have been worked out and it cost Rs 1-12-5 per vehicle per mile omitting cost of tyres, tubes and overhauls, an excessively high rate. We can only say that, in fact, these vehicles were costing so much to run that it was most uneconomical and the work given to contractors at the schedule rate should have cost considerably less. These suspense estimates are not yet closed; as a large number of adjustments and transfers remain to be made.

CHAPTER XI

BIST DOAB CANAL

11.1. The opening of the Bist Doab Canal was marred by an incident which subsequently led to considerable discussion and criticism.

Particulars of the canal.

This canal takes off the right bank of the Sutlej, almost opposite the Sirhind Canal and carries a discharge of 1,601 cusecs at the head. In the first reach, except for about 8,000 feet from the head, it is unlined but a branch of the canal taking off at R. D. 93,487 is lined.

Failure of Regulator.	Temporary
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11.2. The canal was virtually ready in the beginning of April, 1954, except for the first 8,000 feet, which it was hoped to complete shortly. There was, however, a hurdle in the way of formally opening the canal and that was that the gates and gearings for the right under sluices were not ready as originally promised by the manufacturers and there was no hope of getting them for some time. The Chief Engineer (Shri R. R. Handa) was, however, very keen on opening this canal as quickly as possible and a decision was, therefore, taken to erect a temporary regulator. It was apparently thought at that time that this will be constructed within a few days and the date for the opening ceremony was fixed as 21st May, 1954. The work on the temporary regulator, however, did not progress according to expectation and it was finally completed only on the 18th May. Water was let in on the 20th May within two days and during the night between the 20th and 21st of May, one of the bays (No. 41) failed, although the other two bays No. 42 and No. 43 remained in tact. The Chief Engineer was then on the spot and he issued directions for repairing the damage and we understand that wire crates filled with stone were placed in the bed of the river, but much of this effort came to nothing and apart from the temporary regulator a large quantity of stone was also washed away. *When the final stock of this damage was taken, it was found to be of the order of Rs 70,000.* When we heard about this incident during our enquiry and wished to ascertain the facts, we thought that there would be in the office of the Chief Engineer a detailed report about the damage and its causes. We were surprised to learn that there was no such report and we had to question several officers and get help from several collateral documents to ascertain the facts. We are mentioning this because it appears to us that the engineers concerned with this incident attempted at times to gloss over the facts and convey the impression that much publicity to such a matter need not be given. We are not charged with the duty of ascertaining the precise cause of the failure of the temporary regulator but since the matter has come to our notice in connection with the extra expenditure involved, we cannot help noticing the fact that water was possibly let in a little too soon. It seems to us that when it was found that the work on the temporary regulator was likely to go on till the 18th May, 1954, it would have been prudent to postpone the opening ceremony a few days and we are not convinced by Shri Handa's argument that the farmers in the distant fields in Jullundur were so anxiously waiting to plough their fields that the supply of water could not be delayed beyond the 21st May.

11.3. We have mentioned that we found no detailed report about the damage in the Chief Engineer's office, and in fact, in no other office, although there was a report containing some of the facts in one of the estimates prepared in this connection. We wish to say very clearly that it is not wise for any engineer to attempt to place a blanket over some unfortunate damage that may happen and that when damage does occur, there ought to be a proper investigation into its cause and the result of such investigation should be recorded so that succeeding engineers may benefit by it. Had such a course been adopted, a good deal of discussion that followed and much of the time of the Bhakra Control Board, who learnt of this incident much later, could have been saved. The departmental rule, as we understand it, does in fact, require that a proper report

in respect of every damage must be made for purposes of record and the omission of such a report in connection with this incident is to be regretted, all the more, because the Chief Engineer was himself on the spot. The attitude of complacency that such incidents are inevitable and need not be taken notice of, is not really helpful.

11.4. We examined the work of excavating the Bist Doab Canal and have considered in detail ten reaches :—

Excavating Bist Doab Canal.

(1) Reach	.. R. D. 3,000—5,336
(2) Reach	.. R. D. 40,000—42,000
(3) Reach	.. R. D. 42,000—43,000
(4) Reach	.. R. D. 43,000—44,000
(5) Reach	.. R. D. 44,000—45,000
(6) Reach	.. R. D. 45,000—48,500

and then some lower down

(7) Reach	.. R. D. 86,500—88,000
(8) Reach	.. R. D. 88,000—91,000
(9) Reach	.. R. D. 91,000—96,000
(10) Reach	.. R. D. 104,500—108,500

We have found small excesses in earthwork but we are glad to say that in every case, we have been furnished with satisfactory explanations and we need not, therefore, go into the details.

11.5. Regarding the rates, we found that the payment of Hardness Allowance and Wetness Allowance has at times been rather liberal. We are told by the Executive Engineer that some time after the Superintending Engineer had decided upon the classification of soil at various places, he was approached by a large number of contractors and persuaded to make a second inspection which led to an upgrading of classification. We are little surprised that the Superintending Engineer allowed himself to be hustled in this respect ; for the conditions at the site had obviously remained unaltered. We, however, note the fact that the premium for earthwork allowed on this canal was 300 per cent against 325 per cent mentioned in the schedule.

Misclassification of earth-work.

11.6. We have investigated four cross-drainage works, namely :—

- (1) Superpassage at R. D. 49,200 ;
- (2) Drainage Syphon at R. D. 57,200 ;
- (3) Drainage Syphon at R. D. 79,700 ;
- (4) Drainage Syphon at R. D. 83,400.

11.7. Tenders for this work were invited on the 15th May, 1953, and opened on 4th June, 1953. Six tenders were received and the lowest at $\frac{1}{2}$ per cent below schedule was accepted. We noticed certain alterations in some of the tenders, but the Executive Engineer has assured us that these had been made by the contractors before the tenders were put in.

Super-passage at R. D. 49,200.

11.8. We noticed that although a tube-well had been installed for supplying water for construction work, the contractor has separately received payment as water allowance. It is admitted now that this was a mistake and in the final bill a deduction has to be made.

11.9. The earthwork for the foundation was estimated as 6,81,000 c. ft., while payment has been made for 8,55,000 c. ft. The Executive Engineer states that the data on which the original estimate rested was rough and that the site of the super-passage itself was shifted and even the rough data was, therefore, not applicable. We are satisfied with the explanation.

11.10. There is nothing else of particular interest in this work except that the Sub-Divisional Officer could check-measure only 6 per cent of the value of the work and the accounts have not been finally closed although the work was finished by September, 1954.

11.11. The notice inviting tenders for this work was issued on the 20th July, 1953, and tenders were invited for 6th August, 1953, thus allowing only sixteen days' publicity. Thirteen contractors tendered for this work, the lowest being by Jasbir Singh Sethi, at 8.75 per cent below schedule. The work, however, was not allotted to him as another big work was intended to be given to him and in these circumstances, this particular work was allotted to the next lowest tenderer Uttam Singh-Rakha Ram, but at the rate tendered by Jasbir Singh Sethi, namely 8.75 per cent below schedule.

Drainage Syphon at R.D. 57,200.

11.12. We have found that in respect of carriage of bajri, this rebate of 8.75 per cent was not deducted from the contractor's bill subsequent to 2nd February, 1954, and although there was some correspondence about this on the file, we could not find the Superintending Engineer's formal sanction for the waiver of rebate. The Executive Engineer has now assured us that the Superintending Engineer did sanction the non-deduction of rebate on this particular item of work. The concession was allowed to the contractor because it was found that the road to the newly found quarry for bajri was extremely rough and difficult and not only this Executive Engineer, but also the Executive Engineer of the neighbouring Division recommended the concession, which was allowed to the other contractors also.

11.13. There has been an excess in the quantity of cement masonry work and the explanation is to be found in a change of specifications for part of the work and since there has been a corresponding saving in cement concrete work we have accepted the explanation. There was some excess in the expenditure on shuttering which is, however, of no great consequence.

11.14. Carriage of sand was originally provided for from a distance of three miles. In the Superintending Engineer's office, this lead was cut down to one mile, but it appears that the actual distance was about three miles and sand had to be procured from there. The extra expenditure has been met from other savings in the estimate itself.

11.15. About 75,000 bricks appear to have been used over and above the estimated requirements and the Executive Engineer explains that this happened because some temporary structure which it was expected to dismantle subsequently was allowed to stand and also some of the bricks were used as brickbats for the apron and there was a corresponding saving in the purchase of brickbats.

11.16. The lowest tender for this work was at the rate of 6 per cent below schedule by one Davinder Kumar, but he and the next lowest Messrs Jaimal Ram-Ram Saran were not considered fit to do this work and it was allotted to the third lowest, Messrs Ram Singh-Vidya Parkash at 4.6 per cent below schedule. It only made a difference of about Rs 2,600.

Drainage Syphon at R. D. 79,700.

11.17. In this case also there was an excess of earthwork for the foundation, this being about 2,30,000 c. ft. A valid explanation is, however, forthcoming and it appears that subsequent to the original estimate, there was a change in the design and the width of the road was increased from 12' to 24' to accommodate the public road ; only a separate estimate was not prepared. This change in the design also led to increase in the quantities of cement concrete and cement masonry work.

11.18. Tenders for this work were invited on the 23rd of July, 1953, and opened on the 6th August, 1953, and the lowest tender was by H. P. Sethi at 8.5 per cent below the schedule, but the work was not allotted to him as the Executive Engineer thought that Sethi had a good deal of other work to occupy his time and the next tenderer, Jasbir Singh, was, therefore, allotted this particular work at the rate tendered by H. P. Sethi. After some time Jasbir Singh refused to do the work at that rate and the Executive Engineer then picked out a third contractor, namely, Saudagar Singh, who had actually tendered at 4.1 per cent below the schedule, but was persuaded to undertake the work at the lower rate i.e. 8.5 per cent below the schedule. In this case also, concession was allowed to the contractor in respect of the carriage of bajri and the rebate was waived, the reason being the same as in the previous case.

11.19. The proper quantity of sand required for this work was estimated as 1,29,000 c. ft. The intention was to carry sand from the river about four miles away. Later, however, it was found that fairly good sand was available in the bed of the choa close to the site of the work. This sand was tested by the Research staff and approved. The bulk of the supply was, therefore, obtained from there, but as it was not all as clean as river sand, it was found advisable to wash it and payment had to be made for washing about 71,000 c. ft. of sand. Since however, there was a saving on the carriage, the extra expenditure involved in washing can be overlooked. The process of washing also resulted in the loss of some sand which comes to about 15,000 c. ft.

11.20. We noticed a discrepancy in the quantity of mild steel bars used on the work, as payment for bending and binding had been made for about 1,200 cwts. The Executive Engineer states that the quantity issued is incorrect and some of the issues have apparently been omitted. He has verified from the measurement book that the actual quantity used was about 1,200 cwts. and this accords with the completion plans.

11.21. Regarding shingle, it appears that 5,000 c. ft. has been used over and above the requirements. The explanation offered is that wire-netting crates placed on the syphon floor to prevent scour were originally intended to be filled with brickbats, but as enough brickbats were not available at the time, shingle was used for the purpose and there was a saving in the quantity of brickbats. This is a plausible explanation and we have accepted it. There has been a slight excess in the cost of shuttering but again convincing explanation has been offered by the Executive Engineer.

11.22. On the whole, we find in respect of the four cross-drainage works, that nothing very objectionable has happened.

11.23. We have, however, to mention one unsatisfactory fact and that concerns the large collection of bricks in the Bist Doab Division.

Heavy stock balance of bricks.

This consisted of three Sub-Divisions and in each of them a surplus of bricks has purposely been kept in stock. The Executive Engineer explained to us that during construction the Chief Engineer had written a letter pointing out that after construction some bricks and tiles would be necessarily required for repairs and that it was wise to keep some stock of tiles and bricks in hand. This was a counsel of wisdom, but the decision which the Executive Engineer took in pursuance of this advice was calculated to over-reach the mark. He apparently thought that 5 lac bricks per kiln along the main canal ought to be kept in stock over and above the requirements and 10 lac bricks per kiln along the distributaries. The result was that after construction was over in this division, a very large number of bricks remained in stock and at the present moment 13,328,679 bricks are lying at various places. Out of these, only 14,99,099 are said to be required during this year, so that the surplus over the requirement is 1,18,00,000 bricks. These are approximately worth about Rs 3 lac. We know that bricks do not deteriorate rapidly but meanwhile Rs 3 lac has remained locked up. The Executive Engineer stated that all these bricks would be used if the required number of culverts over various water-courses are built; but even so it does not appear to us to justify the locking up of about Rs 3 lac for over three years in this manner.

CHAPTER XII

LINING

12.1. In the case of lined canals, one major item of expenditure is the cost of lining. This is mainly made up of :—

Investigations made.

- (1) the cost of tiles and their carriage to the site,
- (2) the cost of cement and its carriage to the site,
- (3) the cost of sand and its carriage to the site, and
- (4) the cost of labour in laying the lining.

In the case of this project, cement was supplied by the department and so were the tiles. The cost of labour was paid at the scheduled rate and as in the case of earthwork, tenders were not called for individual reaches of any canal except in the case of the Nangal Hydel Channel in the beginning and there too the work was ultimately let out at the scheduled rate. We examined a number of estimates concerning the lining work on the Bhakra Main Line as well as the Narwana Branch and the Bhakra Main Branch. We found some excesses, but these were mainly due to a change in the specifications. As we have mentioned already, there was for some time shortage of cement and for a longer period apprehension of such shortage and in consequence, kankar lime and surkhi were manufactured for replacing cement. It appears, however, that irrigation officers were not familiar with the use of kankar lime and surkhi mortar, and did not feel happy over the employment of that mortar, and as soon as possible, they reverted to the use of cement. It happened, therefore, that in many cases specifications for the mortar as contained in the estimates were changed at the time of execution and this led to added cost. Apart from this factor, the cost of lining over all the canals has been more or less uniform and the only variations have been due to local conditions. It is not, in the circumstances, necessary for us to enter into the details of our examination of the estimates. We also inspected the cement concrete as well as tile lining on the Nangal Hydel Channel and made cuts. It struck us generally that lining work was satisfactory.

12.2. We had heard a general complaint that the cement sand mortar used for the work of lining was not up to the specified strength and in the hope of setting this matter at rest, we decided to investigate it in detail. The lining adopted for the Bhakra Canals consists of two layers of tiles (12" × 6" × 2") one on top of another with a sandwich layer of mortar between the two layers of tiles. The bottom layer of the tiles is laid in cement sand mortar mixed to a proportion of 1 : 5 by volume, its thickness being $\frac{3}{8}$ ", while the sandwich layer of the mortar ($\frac{1}{8}$ " thick) is mixed to a proportion of 1 : 3 by volume. The mortar used to lay and fill in the joints of the top layer is also mixed to a proportion of 1 : 3 by volume. We were anxious to discover whether cement in the right proportion had been used for the two types of mortar and for this purpose we had a number of samples of mortar of both kinds taken out from the lining both of the Bhakra Main Line and the Narwana Branch. In the case of the Narwana Branch, 105 such samples were taken out and sent for analysis to the Silt and Soil Laboratory of the Central Water and Power Commission, Delhi, and for the Bhakra Main Line 30 samples were obtained and sent for analysis to the Irrigation and Power Research Institute at Amritsar. We are attaching the results obtained from both these laboratories (*vide* Annexure 8—Appendix I). These show large variation in the mixes at different places. Thus in the case of the Narwana Branch, the sandwich layer of mortar at one place (R. D. 1,61,000) shows as lean a mix as 1 : 7.4 (cement to sand) as against the specified proportion of 1 : 3

Mix of the mortar—Results of analysis.

while the richest mix is reported at R. D. 2,55,000 showing a proportion of 1 : 2.3. (In this particular reach, the specification was 1 : 2). Similarly in the case of the bottom layer, where the specified proportion of sand to cement was 1 : 5, the leanest mix at R. D. 2,25,000 showed a proportion of 1 : 19.4, while the richest mix at R. D. 2,23,500 showed a proportion of 1 : 3.1. We might here mention that in the first instance, the laboratory had sent us the results of these mixes calculated by weight, but later, at our instance, these were converted to volumetric basis as that was the basis actually adopted during construction.

12.3. In the case of the Bhakra Main Line, the results obtained from the Research Institute at Amritsar are not expressed in absolute terms. What that laboratory did was to take out the richest sample which they found at R. D. 2,01,000 and then compare the cement content of the mortar found in the other samples with the cement content of this richest sample and the results are expressed as percentages of the richest sample. These results also show very large variation. In the case of the sandwich layer starting with R. D. 2,01,000 which was assumed as 100 per cent correct, the leanest sample shows a percentage of cement of only 52.8 at R. D. 3,19,000 and some other samples show a percentage of less than 75. Similarly, in the case of the bottom layer, the lowest percentage at R.D. 360,000 comes as low as 53.6. The results of analysis of mortar in which surkhi was also used are somewhat on the same lines. These results taken at their face value, would indicate that at certain places leaner mixes than specified were used which, in other words, means that the proper quantity of cement was not actually used in the works. Had we been assured of the reliability of these results, we could have easily worked out the extent to which lesser quantity of cement than prescribed had been used. In fact, at one stage, we did work out these figures for the Bhakra Main Line over a length of 26 miles, on the basis of the results obtained from the Amritsar Laboratory, which figures indicated that as much as 36,000 cwts. of cement had been used short of specification which in terms of money means Rs 1,62,000. There is, however, considerable difficulty in determining the extent to which these results can be depended upon and to explain this difficulty we will briefly indicate the methods adopted in the laboratory.

12.4. In the Delhi Laboratory, the method used is that prescribed by the American Society of Testing Materials No. C-85-42. The first step is to determine the soluble silica content in the sample of the mortar. A sample of sand identical to the one actually used in the mortar is then obtained and its soluble silica content determined. Similarly a sample of cement identical to the one used in the mortar is obtained and its soluble silica content determined. On the basis of the individual contribution of soluble silica by each of the two constituents, making up the mortar, the proportions of cement and sand comprising the mortar are computed. D. R. C. Hoon, Director of the Laboratory at Delhi, explained this method to us in detail. The result obtained from the laboratory is accurate enough but the practical validity of it rests on two assumptions viz.—

- (1) that the sample subject to analysis is truly representative of the mortar used on the work, which depends on the uniformity with which the mortar has been mixed, and
- (2) that the samples of sand and cement sent to the laboratory are identical with the sand and cement actually used in the mortar.

In the case of the present project, the mortar used was hand-mixed and real uniformity is extremely difficult to obtain with such a method.

12.5. Regarding the second assumption, it is clear that absolute identity is of course impossible. A very close approach to it could be had by obtaining a sample of cement from the same source from which the original cement was obtained which has been done. In respect of sand, however,

only an approximately similar sample could be obtained after a lapse of over two years and that introduces a large element of error.

12.6. We questioned Dr. Hoon whether he could offer any opinion regarding the mortar actually used for the lining on the basis of the samples analysed by him, and he said that he would not like to offer any opinion. His own words are :—

“ I would not like to offer any opinion as to whether the mortar actually used in any considerable length in a particular reach from which sample has been taken necessarily conforms entirely to the result of the sample. ”

This makes it clear that the result of the analysis really applies only to the sample subjected to analysis and it is not safe to conclude that the other mortar used in the neighbourhood of the sample or a little away from it, is necessarily of the same proportion. As Dr. Hoon expressed it—

“ This would depend on the representativeness of the sample of mortar sent to the laboratory and would also depend on how uniform the mixing of sand and cement has been done for the mortar. ”

12.7. In case of the Amritsar Research Institute, the method for determining cement content is different and rests on the content of Cao., in the sample. We have examined Dr. Uppal, Director of the Irrigation and Power Research Institute, in this connection, who states that although the Cao method is theoretically more reliable and is considered more up-to-date than the soluble silica method, there is still a large margin of error possible in the laboratory results. Before us, he mentioned an instance where a mortar sample in the proportion of 1 : 7 was prepared by an Executive Engineer himself, but when subjected to laboratory test, it showed a proportion of 1 : 9.9. This instance has apparently influenced his opinion. While considering this matter, we cannot forget that actual conditions in the field where construction work is going on at some speed are somewhat different from conditions we are at times liable to imagine and that in the hustle of construction work, it can frequently happen that materials like sand and cement are poured out in proportions not exactly conforming to theoretical specifications. In all these circumstances, we find it difficult to be dogmatic about the actual quantity of cement that may have been used in any part of the lining. Considering, however, that out of 105 samples—51 show appreciably poorer mixes, the indications are that at places smaller proportion of cement has gone into this work. This is not so surprising since the work of the lining was spread over miles and was going on continuously and such supervision as could prevent every kind of pilferage of cement was hardly possible.



सत्यमेव जयते

When machines are set to work, their performance depends on the will of others, and no problem of incentive or inducement to work, so far as they are concerned, exists. But with human beings, the case is quite different. Work by them is not a one-dimensional entity but has intensity as well as duration.

—A. C. PIGOU
(Socialism and Capitalism)





सत्यमेव जयते

CHAPTER XIII

RATES FOR EARTHWORK

13.1. It is claimed on behalf of the officers concerned with the excavation of the Bhakra Canals that the rates actually paid were not excessive and that considering everything, these canals have been dug at a cheaper cost than similar works elsewhere. The argument used is double-headed. First, it is urged that the rates in the Basic Schedule are low and that, in particular,

Basic rate and overall rate for the channels.

the initial rate, as it is called, i.e., the rate of Rs 13 for digging 1,000 cubic feet of earth and carrying it a distance of 50', was totally unworkable in view of the prevailing wage-level and for that reason, it became necessary to pay hardness allowance in nearly every case, even where the ground itself was not hard, and similarly higher rates appearing in the schedule under such descriptions as 'Pick and Jumper Work', and 'Jumper Work' and 'Blasting' had to be paid. This part of the argument depicts the prevalent misclassification of earthwork as a necessary expedient. Secondly, it is contended that it is unnecessary to pay too much attention to the description of the work, and that attention should be focussed on the actual rate in terms of money, and not only that, but further, the average rate for the entire canal should be looked at to see if that overall average rate is really excessive. Thus, it is pointed out that in the case of the Bhakra Main Line, the average rate per thousand cubic feet of earthwork including every allowance, comes to only Rs 29-11-0 and in the case of the Narwana Branch to Rs 26-9-0 and these figures alone should be compared with the cost of similar canals elsewhere. This argument attempts to conceal the very high rates that were paid for a part of the work, which high rates have been counterbalanced to some extent by lower rates paid elsewhere. It is hardly possible for us to overlook the excessive payments that have been made, merely because due to the diligence of other officers elsewhere on the same canal, much lower rates were obtained and although, of course, we will give due consideration to the average rate, we prefer to look at all the facts, as they stand.

13.2. According to the Basic Schedule of Rates, ordinary excavation is possible to be done at a cost of Rs 13 per thousand c. ft. including a lead of 50' and it is further assumed that for every additional lead of 25', the cost would not exceed Re 0-8-0, which, in other words, means a rate of Rs 2 for every additional 100' lead. For harder excavation the schedule provides an allow-

Bhakra Main Line— Classification paid.

ance varying from Rs 4 to Rs 8 and the assumption, we take it, is that the hardest type of soil can be excavated and carried a distance of 50' at a cost of about Rs 21 per thousand c. ft. It is these assumptions which officers like Shri R. R. Handa claim to be wrong in fact, and it is these assumptions that have to be carefully examined. Before doing so, however, it is useful to note how earthwork has actually been paid for on this project and to illustrate this, we have taken the figures for the Bhakra Main Line, as the quantities involved are the largest. The total earthwork done is officially mentioned as 83,53,03,000 c. ft. Out of this only 3,64,14,000 c. ft. has been paid at Rs 13 per thousand c. ft., excluding leads, while the remaining has received some allowance or other. When it is remembered that kassi work alone was of the order of 6 crores c. ft., another 114 lac c. ft. was merely silt clearance, and 92,54,000 c. ft. was excavation by machinery, it becomes clear that some silt clearance and a good part of kassi work has been paid at a higher rate than Rs 13. The following table will indicate the various quantities for which higher rate have been paid :—

C. ft.

Hardness allowance	.. 46,67,64,000
Kankar allowance	.. 18,98,60,000

	C.ft.
Wetness allowance ..	6,54,75,000
Pick work ..	9,71,000
Pick and Jumper work ..	1,71,11,000
Jumper work ..	4,83,85,000
Jumper work with occasional blasting ..	5,11,000
Ordinary blasting work ..	98,12,000
Total ..	79,88,89,000

13.3. It is obvious that Shri S. D. Khungar was right when he observed in April, 1951, as Chief Engineer, Bhakra Canals, that "almost every cubic foot of earthwork is being described as hard", while his personal observation indicated that much of the work was really soft. Our own observation of the pits along the canal leaves no doubt that considerable portion of the earthwork was just ordinary although it succeeded in obtaining hardness allowance. The analysis of figures for the Narwana Branch, presents a similar picture. The argument is that the rate of Rs 13 per thousand c.ft. being much too low and wholly unworkable, for ordinary earthwork, a higher rate had to be paid, and one way of doing that within the terms of the schedule was to call it 'hard', and describe ordinary hard work as 'Pick and Jumper Work' and so on. To appreciate this argument fully, it is necessary to go back a long way and consider the basic factors which determine the rate for any kind of earthwork. The two most important factors here are :—

Analysis of basic rate and its workability.

- (i) the human effort involved ; and
- (ii) the prevailing wage level.

To put it in another way, if we know what the normal output of a labourer is in respect of digging and carrying earth over certain distance and we also know how much it costs to hire such a labourer, it is easy to work out the cost of earthwork per thousand c.ft. Various engineers have, at various times, worked out these figures and we shall presently refer to them, but before doing so, it is wise to take note of the fact that the output of an ordinary labourer shows a large variation in varying circumstances. We say this because human effort is fairly elastic and any man goaded by suitable motives will be found capable of turning out more than double the amount of work that he normally does otherwise and it is an observed fact that the output of a labourer engaged on daily wages is considerably lower than the output of the same labourer employed on piece-work basis. The fact is well-known and we need not labour the point further.

13.4. In 1906, the Superintending Engineer, Upper Jhelum Canal Circle (Mr. J. T. Ferrant) recorded a note expressing his views on the cost of earthwork largely based on his experience on the Upper Jhelum Canal. He divided the soil met within the Punjab into four categories, which he called :—

Ferrant's data.

- (i) Silt and sandy soil ;
- (ii) Sandy loam ;
- (iii) Compact clayey loam ;
- (iv) Hard clay (Pandu).

He estimated that for purpose of excavating earth and filling it into baskets after breaking the clods, the outturn of an ordinary labourer per day was :—

- (1) 300 c.ft. of silt and sandy soil,
- (2) 225 c.ft. of sandy loam,
- (3) 150 c.ft. of compact clayey loam ; and
- (4) 50 c.ft. of hard clay.

He then assessed the effort involved in leading the excavated earth. He was aware that the Famine Commission of 1898 had estimated that an ordinary cooly carry only 100 c.ft. of earth to a distance of 100 feet in one day, but noticed that in fact an ordinary labourer could do much more and estimated that 225 c.ft. of ordinary earth could be so carried a distance of one chain or 100 feet by one cooly in the course of one day of 500 minutes. He concluded, therefore, that the number of carriers required for loading 1,000 c.ft. of earth to a distance of one chain or 100 feet would be—

$$1000 \div 225 = 40/9$$

Wages at the time were Re 0-4-6 per day per cooly, who dug the earth and Re 0-3-0 per day for the carrier. On these assumptions, he estimated that the cost of digging and carrying 1,000 c. ft. of ordinary earth, falling under item (2) —described as 'sandy loam', would be for a lead of 50 feet, Rs 2-15-0, for a lead of 100 feet Rs 2.63, and for a lead of 400' Rs 6.07. In working out these rates, Farrant included contractor's profit to the extent of $12\frac{1}{2}$ per cent.

13.5. The wage rate prevailing at the time of the present project was about Rs 2 per day for a digger or male labourer, and Rs 1-8-0 per day for a carrier, or woman labourer. If we apply this rate to the assumptions made by Farrant in respect of the output the result would be as follows :—

Digging 1,000 c.ft. of sandy loam.

Diggers required	..	1000		40
		<hr/>		<hr/>
		225		9

Cost .. Rs $40/9 \times 2 =$ Rs 80/9

Cost of leading to 100 feet .. (Rs $40/9 \times 3/2 =$ 20/3

Total Cost = (Rs 80/9 + Rs 20/3) = Rs 140/9

i.e., Rs 15.55.

The actual rate for 1,000 c. ft. of earthwork with a lead of 100 feet, according to the Basic Schedule of Rates, comes to only Rs 13 + Re 1 = Rs 14. It would, therefore, appear that even for sandy loam the rate in the Basic Schedule is substantially lower than what seems justified on Farrant's assumption.

13.6. Another fact to be noted is that the cost of leading earth by headloads as estimated by Farrant is much higher than the rate provided in the schedule. It is Rs 6.4 for 100 ft. while in the schedule the rate for the extra lead is only Rs 2 per 100 ft.

13.7. The Rates and Costs Committee appointed by the Government of India recently worked out the cost of leading earth by basket loads as well as by donkeys and came to the conclusion that the cost of leading 1,000 c.ft. of earth by baskets over a distance of 50 feet would be Rs 2.6, which means for a lead of 100 feet a little over Rs 5, and by the use of donkeys the

cost was found to be varying from Rs 1-8-0 to Rs 2 for every extra 50 feet lead, which means Rs 3 to Rs 4 for every 100 feet. The wage rate assumed by the Rates and Costs Committee was lower than the prevailing wage rate in the Punjab, namely, Rs 1.8 for a male labourer and Rs 1.3 for female labourer for carrying and what is more, no contractor's profit was included.

13.8. It is clear that both the authorities we have mentioned largely support the contention that the initial rate appearing in the Basic Schedule is a bit too low. This is supported by the opinion of nearly every irrigation officer we have consulted and Dr. A. N. Khosla, Vice Chancellor of the Roorkee University, is also of the view that the rate of Rs 13 is on the low side, and the conclusion is further confirmed by the fact that a Committee of Engineers has recently recommended to Punjab Government that the initial rate of Rs 13 be raised to Rs 15 and the rate for every additional lead of 25 feet be raised from As 8 to As 10.

13.9. We have considered this matter so far from the theoretical standpoint and our discussion has assumed that the wage level is something

Other factors influencing the rate.

fixed. In practice, however, the rate for earthwork and in fact the wage rate itself is very largely determined by the demand for labour at any particular time and the supply of labour then available.

When labour is plentiful and the demand for it not so large, wages tend to fall and with it fall the rate for earthwork. When, however, the demand for labour is so large that there is, over a period of time, not enough of it available, wages will be forced up and with wages will rise the rate for earthwork. We have actually seen this happening in the case of the Bhakra Canals. In the beginning, when work started at a leisurely pace it was possible to keep the earthwork rates within the terms of the schedule, because the supply of labour was more than enough to meet the demand. Later, however, when the speed of work was accelerated and shortage of labour became acute, higher rates were demanded. It is in the context of these circumstances that the actual payments have to be viewed.

13.10. When for the facility of our observation, some pits were dug with departmental labour, we had the cost of such digging worked out. The

Workable ceiling rate and excessive rates paid.

labourers were paid at the rate of Rs 2 per day and we found that in respect of the pits involving the hardest kind of work the cost per thousand cubic feet came to Rs 30 to Rs 32. These pits were

located at places where the stiffest kind of soil was said to have been met with. Incidentally, no jumpers were needed to dig up the pits. We know that the labourers digging these pits were working restricted space and also that they had no particular incentive to work hard. On the other hand there is the fact that the cost as worked out does not include any profit for the contractor and the possibility that due to the running of the canal the ground in its neighbourhood is now not so hard as it was during construction. The rate of Rs 30 to Rs 32 roughly corresponds to the rate provided for jumper work in the schedule, being Rs 33 per thousand c. ft. with a lead of 50'. Making every allowance for the shortage of labour that came to exist at the peak of construction, it seems to us that if the whole of the work had been properly planned and executed in an orderly manner, no rate higher than Rs 33 per thousand c. ft. with the initial lead of 50 feet need have been paid even for the hardest type of excavation encountered. We find no proper justification for any rate higher than Rs 33. We are aware that in the beginning of 1954, circumstances arose in the III Division of the 1st Bhakra Main Line Circle, where a good part of the work still remained to be done and the time for opening of the canal was not far off, that enabled the contractors to demand very high rates, but this virtual extortion could well have been avoided if the excavation work had been properly planned. What appears to have happened is that most of the contractors were at most places allowed to do the easier part of the work and then leave to find similar easy work elsewhere while the hard work was left over till the end. With more efficient planning and better management, such a situation need not have arisen and there should have been no occasion

to resort to the rates for blasting. Shri L. S. Gupta, who was the Superintending Engineer, 1st Bhakra Main Line Circle, admitted that in actual fact, no blasting was necessary and the hard earthwork paid at blasting rates could have been done with jumpers, had there been sufficient time available, and considering that excavation work was spread over 5/6 years it is difficult to believe that sufficient time should not have been available provided, of course, the whole work had been carefully planned. In our opinion, therefore, payments made over and above the rate of Rs 33 per thousand c. ft. of earthwork are attributable to ill-planning and inefficiency. *The excess payments work out as follows :—*

Bhakra Main Line.—

Jumper work with occasional blasting—

5,11,000 c. ft. at (Rs 43-8-0—Rs 33)=Rs 10-8-0 per thousand c. ft. .. Rs 5,400

Ordinary blasting—

98,12,000 c. ft. at (Rs 69—Rs 33)=Rs 36 per thousand c. ft. 3,53,000

Narwana Branch.—

Jumper work with occasional blasting—

80,97,000 c. ft. at (Rs 38-8-0 *—Rs 33)=Rs 5-8-0 per thousand c. ft. .. 44,500

Ordinary blasting—

1,11,000 c. ft. at (Rs 55 *—Rs 33)=Rs 22 per thousand c. ft. 2,400

Total .. 4,05,300

Or Rs 4 lacs.

(*) Cost of explosives not paid.

13.11. We had a large number of pits dug along the Bhakra Main Line, the Narwana Branch, the Bist Doab Canal, and the Jullundur Branch and took observations of the soils found there. These we have indicated in a number of charts (*vide* Annexure 9, Appendix I) alongside the classifications as they appear to have been made by the Departmental officers judged from the actual payments. Our observations do not exactly correspond to the payments. For instance, while we are on the basis of our observations led to believe that in the case of the Bhakra Main Line, about 36 per cent of the work should have been classified as ordinary, payments at the ordinary or initial rate have been confined only to about 3½ per cent. This is, of course, not so surprising considering that it is freely admitted by irrigation officers, that even ordinary earthwork was paid at higher rates to make the over all rate workable. In this state of affairs, it is not possible to calculate the amount of excess payment due to a rate higher than workable, and in the particular circumstances, we only wish to record our general impression that on the whole there has been too liberal an upgrading of soil classification over these canals.



सत्यमेव जयते

A Tree is known by its fruit.



सत्यमेव जयते



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CHAPTER XIV

PURCHASE OF STORES

14.1. The contractors in the Irrigation Department are employed mainly for supplying labour, while the material required is procured by the Department. Some items of material are purchased from the open market, some through agencies controlled by Government and some items are manufactured under Departmental supervision through the agency of other contractors. The departmental stores have to be kept well stocked in anticipation of requirements, but at the same time care has to be taken that there is no unnecessary overstocking as that involves locking up of large amounts of money apart from possible deterioration of perishable articles. Out of the main items needed for construction of works three, namely, cement, steel and coal, were controlled by the Central Government and as far as cement goes, there was, for a period of time, considerable shortage which forced the Project authorities to undertake the manufacture of substitute in the form of kankar lime. Cement, steel and coal were mainly obtained through the authorities controlling them and the supplies were allocated to the various circles and divisions in proportion to their requirements. To this extent, there was in the present project, control over the supply and distribution of these materials. In respect of other items, however, there was, really speaking no Central Control either for the scrutiny of the local requirements or for a real check on the accumulation of unnecessary stocks. The only controlling factor was the monetary limit placed on the power of each officer for the purchase of articles and the stock limits laid down for each Division and Circle. Speaking generally, we may say that the Circle Officers were left to gauge their requirements and to place the necessary orders and in practice, the Circle Officers accepted the proposals of the Divisional Officers. In the Central Office of the Chief Engineers there was, we find, no handy data against which the accumulation of stocks could be checked and timely warning regarding over-accumulation given. So meagre was the information available to the Chief Engineers that when apparently large stock had accumulated in certain divisions, the Chief Engineers had to start an enquiry to discover if in actual fact the stocks were in excess of requirements. In the 39th meeting of the Bhakra Control Board, it was reported that in five Divisions which had been closed down, stocks worth Rs 64 lacs had accumulated and when the Bhakra Control Board wanted information, the Chief Engineers concerned had to ask for time to enquire into the matter and the enquiry took more than four months. It is true that it is not always possible to accurately estimate the requirements in respect of a particular item and small accumulation of stock is to some extent inevitable, but if this is not to happen on a large and somewhat ruinous scale, it is necessary that there must be, in existence, a device by which the process can be checked. We can see no difficulty in estimating the requirements concerning the main items of material, however, heavy the construction programme be, and the explanation offered by the Chief Engineer to the Bhakra Control Board that "Due to very heavy construction programme the exact requirements could not be gauged" does not sound convincing unless the implication be, that the programme itself was not sufficiently firm. It is clear that once the volume of works is known and the order in which the works are to proceed is determined, no difficulty can arise in deciding the quantity of each kind of material required at a particular time and it is, in our opinion, essential that details of construction programme must be chalked out well in advance and the materials procured accordingly.

14.2. The occasion for manufacturing kankar lime and surkhi arose when it was found that there was likely to be shortage of cement. As early as 1949, Punjab Government had considered the advisability of starting manufacture of kankar lime which could be used for certain purposes just as satisfactorily as cement. The actual need for manufacture arose when the work of lining started seriously towards the end of 1952. The need for these materials was thus anticipated, but the actual manufacture appears to have been somewhat

Procurement Procedure and Control.

Excessive purchases of kankar lime and Surkhi.

delayed and right at the time when supplies of these new materials, i.e., kankar lime and surkhi became available in large quantities, the cement situation began to ease, with the result that although cement was available for the 1st Bhakra Main Line Circle, the Superintending Engineer had to request for restriction of supply so that he could accept kankar lime and surkhi to which he was committed with various contractors. In September, 1953, Superintending Engineer, 1st Bhakra Main Line Circle, had to write to the Procurement and Focal Officer that the supplies of cement for the month of October may be cut down and he said:—

“ I have done this accordingly taking into consideration our commitments for kankar lime to be obtained from three quarries in the Circle and also to use stocks of cement that have accumulated during the last three months on account of heavy and continuous rains which practically kept at standstill all our works ”.

14.3. In October, 1953, the Chief Engineer ordered that the use of Kankar lime must stop by the 31st of March, 1954. This was done for technical reasons as it was known that kankar lime mortar takes nearly three months to set properly and the date for the opening of canals had already been fixed as July, 1954. In the meantime, however, the 1st Bhakra Main Line and Narwana Circles had got so involved in the manufacture of kankar lime and surkhi that, although the contractors working the quarries had been firmly told that no kankar lime would be accepted after the 31st December, 1953, supplies continued to be received even after March, 1954. We asked the Superintending Engineer, 1st Bhakra Main Line Circle to furnish us with figures concerning the quantity of kankar lime and surkhi that was in stock in September, 1954, three months after the Bhakra Canals had been formally opened and we were surprised to learn that on that date, i.e., the end of September, 1954, 2,15,100 c.ft. of kankar lime and 1,62,900 c. ft. of surkhi was still lying in stock. At the same time, 4,466 tons of cement worth Rs 4 lakhs were also in stock. The picture is disquieting and we suspect that a part of the accumulation of kankar lime and surkhi was due to this, that the contractors engaged in the manufacture of these materials found it profitable to continue the manufacture, and persuaded the officers concerned to accept supplies in excess of requirements. Kankar lime deteriorates quickly and it is not much in use in the department. We have been told that some of the quantity of kankar lime left in September, 1954, has since been used, but about one lac c.ft. is still held in stock, much of which is now set. It has been stated by some engineers that some of the kankar lime which has set can be and will be used in place of boulders for pitching, but we regard this as wholly impracticable.

14.4. 1,15,100 c.ft. of kankar lime is worth Rs 1,00,000 at the departmental rate, which amount need not have been kept locked up in this manner. Out of this stock, which was still held in the Circle, at the time of our enquiry, and stated to be about one lac c.ft. the part which we inspected seemed hardly fit for any further use, and even allowing some margin in this respect, it would appear that about 75 per cent or, in other words, about 75,000 c.ft. of kankar lime may be called a dead loss costing Rs 70,000. We notice that this over-accumulation of stock concerning cement and kankar lime taken together was partly the result of policy and the Chief Engineer, Shri R. R. Handa, has stated before us that he did not wish to take any risk of being short of mortar material for lining work and he wanted to keep in hand both cement and kankar lime, in case supplies of cement suddenly dried up towards the end. It does not, however, appear to us that there was anything in the facts as they were in October, 1953, to justify any apprehension in this respect and we think that supplies of kankar lime should have been drastically cut down and this perishable material not collected in such quantities.

Heavy stock balance and wastage.

14.5. In the 2nd Bhakra Main Line Circle, the story more or less repeated itself. It appears that by the time the manufacture of kankar lime and surkhi gathered speed and supplies became available, cement began to arrive in larger quantities than was needed. A decision was, therefore, taken to keep the cement in stock and exhaust the stock of kankar lime to the extent that was possible. The result was that unwanted cement accumulated at places where unfortunately proper arrangement for safe storage could not be readily made, and during the monsoon of 1954, a large number of cement bags were damaged. When we looked into this matter of accumulation of cement in the Sirsa and Dabwali Divisions, the Executive Engineers, in charge, explained that cement had been sent to them much in excess of their stated requirements and it was suddenly found that they were short of storage facilities and improvised arrangements had to be made in the form of hurriedly hired godowns, which arrangement proved unsatisfactory. The figures concerning the indents of cement and the actual supplies as furnished by the Executive Engineers indicate that, while in October, 1953, Sirsa Division indented 3,000 tons of cement, 5,000 tons was allotted to that division and in fact, 5,683 tons was sent. In September, 1953, 1,540 tons was indented while 2,093 tons was received. In the Dabwali Division, similarly the total indent for the months of October, November, and December, 1953, was of the order of 7,128 tons against which actually 9,718 tons was received and in the next quarter, January to March, 1954, 1,408 tons was indented ; while 3,390 tons was received.

14.6. Apart from the locking up of unnecessary cement in this manner, the damage caused to cement on account of faulty storage is more disturbing. At one place in Khuian in the Sirsa Division, 16,800 bags of cement were damaged during rains. An attempt was made at the instance of the Superintending Engineer to screen out some useful cement out of this, but still the total loss was estimated as Rs 49,850. At another place in the same division, viz. Kalanwali, 5,000 bags worth Rs 22,612 were similarly damaged and yet at another place and for similar reasons 2,442 bags were damaged. The total loss estimated is Rs 82,000, a very considerable amount which under more efficient arrangements could well have been saved. We ourselves had occasion to look at some of the godowns for storage of material and were not impressed by the manner in which fairly valuable stores were being kept. The cost of building material is now high and it is time that the department paid more attention to arrangements for proper storage of perishable material and we have no doubt that the extra cost will be more than justified.

14.7. For manufacturing bricks and tiles, large quantities of slack coal were purchased from time to time. The requirements of bricks and tiles were known or at any rate ascertainable and since the quantity of coal required for manufacturing a determined number of bricks is also known, there ought to have been no difficulty in determining the precise requirements for coal. When, however, we looked into the purchases of coal made in connection with the Narwana Brnch, we found that these far exceeded the actual requirements. We have prepared a statement to indicate the issue of coal in the two divisions and the total consumption of coal along with the balances left after the required number of bricks and tiles had been manufactured and we find that there was at the end of the construction, 4,907 tons of coal left on hand. Out of this surplus coal, 3,605 tons had to be disposed of by auction, as it was no longer required, while only 685 tons was used in the manufacture of surkhi. The total consumption of coal in the eight sub-divisions concerned appears to have been of the order of 47,800 tons and it seems to us that the surplus balances left with the Department, i.e., about 5,000 tons was excessive and with adequate planning, such quantity of coal ought not have been so left. We gather that by the time the surplus coal was auctioned, the price had

risen but in spite of that the sale resulted in loss because quite possibly some of the coal in the meantime had deteriorated and in any case large sales in this manner must have brought the price down. The total amount fetched by the auction of 3,600 tons of coal came to Rs 1,30,000. The actual stock value of the coal was Rs 1,57,000 so that there is on this transaction of auction sale, a loss of Rs 27,000. This, apart from the consideration that a lakh-and-a-half of rupees need not have been locked up in unnecessary coal.

14.8. Something similar though on a larger scale happened in the case of the Bhakra Main Line and the statement prepared by us will show that the actual purchases of coal considerably exceeded the actual requirements. In all, 1,28,490 tons of slack coal was purchased during the year 1949-50, its approximate value being Rs 38.5 lacs. For the manufacture of bricks and tiles, no more than 1,08,123 tons slack coal was used. Another 3,365 tons coal was consumed in connection with the manufacture of kankar lime at three quarries. Thus the total consumption came to 1,08,123 plus 3,365 tons=1,11,480 tons and at the end of this construction period, a balance of 17,000 tons of slack coal lay in hand. This is in spite of the fact that the actual consumption of coal for the manufacture of bricks and tiles was in excess of the estimated consumption; but leaving that matter alone, it is clear that with proper planning a good deal of coal need never have been bought and kept in stock. Out of the balance of 17,000 tons, a part was transferred out of the circle but this still left a balance of 7,392 tons lying at various kilns for which apparently even other circles had no further use. This coal was later on disposed of by sale and *the sale resulted in considerable loss of Rs 92,721*, the details of which are shown in the statement (*vide annexure 10 of appendix I*) prepared by us.

14.9. The case of purchases of pipes and pipe fittings in the Kaithal Division was brought to our pointed notice as one aspect of it was already in the police hands. We are not really concerned with fixing responsibility of individual officers in connection with these purchases. Our only interest lies in this, that the facts of this case furnish a very good illustration of a kind of thing that must not be allowed to happen in connection with the purchase of stores. The facts are interesting; although in the result they prove fairly expensive.

Excessive purchase of pipes and fittings at higher rates.

14.10. By the beginning of 1953, the Executive Engineer, Kaithal Division, had become conscious of the necessity of starting lining work on the canal as soon as possible so as to complete it by the middle of 1954. He required some pipes and pipe fittings for the work of compaction as well as the work of lining the canal and it appears that he started writing to the Sub-Divisional Officers in order to gauge their requirements in this respect. On the 14th May, 1953, he wrote to the Sub-Divisional Officers, Badhera and Thanesar by name, and said,

“ I have already requested both the Sub-Divisional Officers as well as the Mechanical Overseer to put up to me a detailed statement of pipes and fittings required both for compaction as well as for the lining work, also showing the up-to-date articles in hand in both the Sub-Divisions and the balance required. It is regretted to note again that although this information is very urgent and necessary in order to place orders for the balance articles, the Sub-Divisional Officers are not paying proper attention to this important item. I would request you to give it serious consideration and work out your requirements of the balance pipes, fittings, hoses and tanks, etc. This should be discussed with the undersigned so that orders for the same can be placed immediately. ”

About a fortnight later, on the 4th June, he again wrote, this time to the Sub-Divisional Officer, Mechanical,

“ I have been requesting the Sub-Divisional Officers, Badhera and Thanesar, as well as your Mechanical Overseer to work up the total requirements of pipes and pipe fittings for arranging water for the lining. It is regretted that the orders have not been complied with so far properly. ”

Then again on the 3rd July, to his Sub-Divisional Officer,

“ I have personally written a number of letters to you and personal reminders to you on telephone and otherwise regarding the submission of your requirements of pipes and fittings as well as pumps and other things necessary to start all the headings of lining on the 1st of September. I regret to point out that in spite of your day-to-day promises, this most vital and essential information is not forthcoming. ”

14.11. The note of urgency in these communications is unmistakable. What is not so clear, is the precise cause of delay in estimating the requirements. We should have thought that the simplest thing for the Executive Engineer was to summon a meeting of the Sub-Divisional Officers and work out the requirements sitting round a table. The Executive Engineer says in his evidence before us that he depended entirely on the Sub-Divisional Officer, Mechanical, to gauge the requirements and furnish him with necessary information ; while the Sub-Divisional Officer, Mechanical (who at the time was Shri Narinder Nath) says that the Executive Engineer hardly needed any assistance in that respect and that he himself was merely under training and had not the slightest idea as to precise requirements and further that the actual requirements were finally worked out by the Executive Engineer himself and he, the Sub-Divisional Officer, was merely asked to put his signatures to the communication. Which of these two officers is speaking the truth will, we suppose, be discovered only on completion of the detailed investigation which another agency is presumably conducting. We are content to note the fact that the two officers have tried to put the blame on each other. To proceed with the narrative, the communication signed by the Sub-Divisional Officer, Mechanical, and addressed to the Executive Engineer, dated the 12th August, 1953, contained the requirements as worked out and on the basis of those requirements, quotations were called and finally, orders for pipes and pipe fittings were placed in October, 1953. Nearly nine months had thus been wasted in these preliminaries which we now think would not have taken more than a month or so. By the time the orders were placed and the supplies became available, the need for some of the articles had become so urgent that in the words of the Executive Engineer—

“It became necessary, at times, to obtain these goods from Delhi through a special messenger”

in an attempt to save the time ordinarily taken in obtaining delivery from the Railway Station. The orders were supposed to have been placed on the basis of the lowest quotations ; but it is now freely admitted that some of the quotations were overlooked and that the prices actually paid for some of the articles were excessive. We have prepared a statement indicating the quantities of each kind of article actually purchased and the quantity actually issued for use and the statement shows very heavy balances left in stock and never brought into use. The statement further shows that the total value of the articles purchased was about Rs 6,35,204 ; while the value of the total issues only came to Rs 1,92,523 and goods worth Rs 4,42,681 just remained in stock. Some of the figures are amazing. A total length of 7,521 feet of 2" black pipe was purchased and out of this only a length of 20 feet was brought into use and the balance, 7,501 feet, remained just in store. In the case of 1½" pipe out of a total length of 15,135 feet, only 5,494 feet was brought into use. A length of 27,184 feet of 3" G. I. pipe was purchased

and out of that only a length of 3,240 feet was ever used. 4,381 Nos. 4" G.I. sockets were purchased while the department could find use for only 242 of them and the balance 4,139 sockets remained unpacked. 3" plugs purchased were 4,072 and use could be found for no more than 109 of them, leaving a balance of 3,963 permanently in the store. Even more astonishing is the fact that many articles in large quantities were bought, which were never brought into use, the apparent conclusion being that they were never required. Thus, 2" G. I. pipe was purchased the length being 3,036 feet. Not a single foot was ever used and the whole was left lying in the store. 3" victaulic pipe length 14,434 feet similarly remained throughout in the store. Similarly a length of 1,825 feet suction pipe was never brought into use. We have prepared a statement (annexure 11, appendix 1) of various articles which seem to have been never required and which were never used. *The total value of these goods comes to Rs 93,996 or say Rs 94,000.*

14.12. We questioned the Executive Engineer with regard to these purchases and his explanation revealed a pathetic state of affairs. He admits that the requirements of pipe fittings mentioned by the Sub-Divisional Officer, Mechanical, were in excess of the actual requirements, and adds—

"I am not a qualified Mechanical Engineer and I had to trust and depend on the Sub-Divisional Officer, Mechanical."

The other part of the explanation offered is in these words—

"Regarding the purchase of a large number of pipe fittings in the Kaithal Division, I wish to say that I was very much pressed for time ; because the canal was to be opened in July, 1954, and my lining work could hardly start before the beginning of the year. I, therefore, depended largely on the Mechanical Sub-Divisional Officer as to the actual requirements and also in respect of the rates."

When we asked him about the purchase of 4" sockets, which could not possibly be fitted to any pipe as no 4" pipe was available, this officer said :—

"Actually there was intention at one stage in December, 1953, to purchase 4" pipe for lining. Soon afterwards, however, the Sub-Divisional Officer, who succeeded Narinder Nath, namely, A. S. Sekhon, decided that it was unnecessary to purchase the pipe length. The order for 4" pipe was, therefore, not placed, nor was the decision to purchase such pipe ever recorded anywhere. The fact that 4" sockets had already been ordered was overlooked and order for them was thus not cancelled."

We are aware that the Executive Engineer was pressed for time, but we cannot comprehend such inconvenient lapses of memory as lead to the purchase of articles that could not possibly be used.

14.13. 3" plugs were required by the Executive Engineer and it was decided to purchase 50 dozens of them. Somehow, the letter conveying the order to the firm happened to mention not 50, but 500 dozens and the firm insisted on supplying the whole of 500 dozens. The Executive Engineer says that this was a typographical error of which the suppliers took advantage, and although it was at one stage intended to return to the suppliers the extra supply, this was not done for the curious reason that in the meantime the police had started investigation into some matters in the neighbouring division and it was thought prudent not to do anything which might appear underhand to the police. Nobody appears to have thought the price of 450 dozen 3" plugs was worth saving.

14.14. The more sordid aspect of these purchases arises out of the prices actually paid for various items which, in some cases, appear to have been twice the fair market prices. We have obtained information in this connection, from the Central Stores, Nangal, and also made enquiries from the market generally and there remains no doubt in our minds that the prices paid for some of the items were too high. The broad fact is now freely admitted. The Executive Engineer says that he had not the slightest idea about the price of these various items nor did he ever obtain any information regarding prices. He merely depended on the Sub-Divisional Officer, Mechanical, and the fact that the quotations had been called and the lowest quotations selected by the Sub-Divisional Officer. The Sub-Divisional Officer, of course, says that he was mere tool in the hands of the Executive Engineer. His successor in office, Shri A. S. Sekhon, who helped to cancel the orders for some of the unnecessary goods says that information regarding the fair price of various items did not depend on any knowledge of mechanical engineering and was merely a matter of obtaining correct information from the market. He says further :—

“I remember the case concerning 4" sockets for pipes and I can now say that the price paid, i.e., Rs 7 each socket, was high and that actually these sockets should have cost something like Rs 5. I have learnt, that the Controller of Stores, Jullundur, had a rate contract at Rs 5-8-0. The fact that this particular firm which supplied the goods was overcharging Government came to light much later.”

The Executive Engineer also admits the fact of overpayment thus :—

“4" socket was a rate contract item and the rate agreed was Rs 5-8-0 and if this had been brought to my notice, I would not have gone beyond the rate contract”

And then adds :—

“As soon as I learnt that in the Rajpura Division G. I. 4" sockets were purchased at Rs 5-8-0 each, I ordered the Sub-Divisional Officer, Mechanical, to recover the extra amount from the firm and if I had not been transferred, recovery would have been made.”

The actual price paid for these 4' sockets was Rs 7 each.

14.15. Another curious fact is that the Superintending Engineer's sanction was obtained for the purchase of 4" sockets at Rs 7 on the very same day on which another sanction also for 4" sockets was obtained at Rs 3 each. The Executive Engineer says that the lower priced sockets were cast iron sockets while the higher priced sockets were heavy galvanised iron sockets, but admits that when quotations were called for 4" sockets no specifications were mentioned. Nor did the recorded sanctions make any such distinction. We compared the prices paid for other items with our information regarding the fair price and have prepared a statement to indicate the extent to which the excessive prices were paid (*vide* annexure 12, appendix I). To mention only a few instances, it appears that for a length of about 2,400 feet of 4" black pipe Rs 13,643 were paid while the fair price worked out by us comes to Rs 6,658. Similarly for 4" G. I. pipe of which a length of 9,748 feet was purchased, the price paid was Rs 76,837, while the market price works out as Rs 31,988.

3" G. I. bends—48 in number—appear to have cost Rs 998 ; which on our information should have cost not more than Rs 276. The statements show that the total price paid comes to Rs 6,17,000 as against the fair price worked out by us, i.e. Rs 4,20,000, showing an excess payment of Rs 1,97,000. We are willing to allow another deduction of 20 per cent to account for market fluctuations and there still remains a substantial amount of Rs 1,13,000 as excess payment.

14.16. We were surprised to find that the Executive Engineer, who is an officer of about eighteen years' experience should have, for gauging the requirements and deciding the rates, chosen to depend on the judgment of a Sub-Divisional Officer, who was still under training and in the process permitted himself to place extravagant orders for unneeded stores. We cannot say if this was the result of merely callous neglect or calculated dishonesty on the part of some of the officers; for the degree of neglect, if it was neglect, has been such that it is indistinguishable from downright dishonesty and the kind of prudence we would expect from a public officer, handling public funds has been wanting in this case. The consequent loss as worked out by us, here, has been:—

		Rs
(1) Excess payment of price	..	1,13,000
(2) Unnecessary purchase	..	94,000

14.17. Something very similar, although on a smaller scale, happened in respect of the purchase of hose pipes in Kaithal Division. These

Purchase of hose pipes—
Inferior quality obtained
at higher rates.

pipes were required for the delivery of water at suitable places for construction work. On the 5th September, 1953, the Executive Engineer advertised in the "Tribune" calling for quotations for the supply of 25,000 feet of 1½" 3 ply hose pipe conforming to I. S. D. specifications. Quotations were required to be submitted by 12th September, 1953, a surprisingly short time, and the actual supply was demanded within ten days. It is obvious that in these circumstances, only those dealers who were ready at hand could compete. Quotations were received and it was found that the lowest quotation was by one firm (V.S. Kumar and Co., New Delhi), the rate quoted being Re 1-3-9 per foot less 5 per cent, in other words, Re 1-2-9 per foot. An order for supply was, therefore, placed on that firm on the 13th September, 1953, and the direction given was that 5,000 feet be despatched to the Sub-Divisional Officer, Thanesar, and another 5,000 feet to the Sub-Divisional Officer, Badehra, and the balance of 15,000 feet to be supplied within two to three months to the above Sub-Divisional Officers in equal share. The Executive Engineer informed the Sub-Divisional Officers, Thanesar and Badehra, about this order and further directed that "the material of I. S. D. specifications alone should be accepted." The supplier firm, it appears, approached a firm in Bombay, who were agents for the manufacturers, and placed the order with them. The Bombay firm thereupon wrote to Messrs. V. S. Kumar and Co., that it was not possible to supply hose pipe of I. S. D. specifications; but suggested that "as a very special case, we shall request our principals to manufacture this quantity in some better quality than our usual Diamond Brand quality" and asked if this was acceptable and in the result, the Bombay firm asked the manufacturers in Calcutta to manufacture and supply the required length of hose pipe. In due course, the supplies were received. Nobody appears to have suspected at that time that the quality of hose pipes supplied was inferior and not in conformity with the I. S. D. specifications and it was only later that the fact came to light. Some of the samples of the pipe were submitted by the police for inspection by an officer of the Director-General, Disposals, of Government of India and Government Test House, Alipore. The results indicate that most of the length of this hose pipe was merely single ply, much inferior in quality to I. S. D. specifications. Assuming that the departmental officers were over-reached by the supplier firm, there is no doubt that there was considerable slackness in properly checking the goods purchased by the departmental officers and due to this negligence, Government has suffered an apparent loss of Rs 5,800. We have compared the rates actually paid for the quality received with the market rates charged by the manufacturer firm in respect of their usual hose pipe and we find that *the Irrigation Department has been overcharged to the extent of Rs 4,300.*

14.18. The Narwana Branch had to be lined quickly and it became necessary, therefore, to start a large number of headings simultaneously, which necessitated the purchase of a large quantity of timber for making templates and ladders. In respect of the Kaithal Division, this question was apparently first mooted in August, 1953. The normal procedure for such purchases was for the Executive Engineer to obtain competitive quotations from reputed firms and to have the rate approved by competent authority which in this case was the Superintending Engineer, purchase of course to be made after such approval. Concerning the Kaithal Division, the first recorded sanction by the Superintending Engineer is dated the 26th October, 1953, on the recommendation of the Executive Engineer, dated the 16th October, 1953. The sanction related to the purchase of 4,550 sleepers classified as follows:—

Excessive purchase of
Timber at higher rates.

(1) Deodar sleepers	..	200
(2) Kail sleepers	..	350
(3) Chil and Fur	..	4,000
Total	..	4,550

14.19. Actually, however, the first purchase was made in the first week of October, 1953, when the Sub-Divisional Officer, Thanesar (Shri Santokh Singh), went to Doraha and bought from Messrs K. C. Bhalla and Co. 3,950 sleepers. So confused and contradictory have been the impressions of the two responsible officers in respect of this transaction, that when they appeared before us, the Superintending Engineer was of the view that his sanction for this purchase of 3,950 sleepers was obtained only on 26th October, 1953, by a misrepresentation that the timber in question was yet to be bought and that if he had known that timber had actually been bought already on the 4th or 5th of September, he would not have accorded sanction to the purchase; while the Executive Engineer stated that the purchases on 4th/5th September, 1953, had nothing to do with the sanction accorded on the 26th October, and that the earlier purchase was made with the knowledge of the Superintending Engineer and after his verbal approval to the rate. In this state of affairs, it became necessary for us to go through the entire record and the story as we have been able to disentangle it, is as follows:—

14.20. On the 19th August, 1953, the three Sub-Divisional Officers in the Kaithal Division prepared an estimate of their requirements of timber and reduced it into writing in this form:—

	Thanesar Sub- Division	Budhera Sub- Division	Markanda Sub- Division
Deodar sleepers 10' × 10" × 5"	..	700	..
Kail sleepers 12' × 10" × 5"	..	2,800	2,100
Chil or kail sleepers 10' × 10" × 5"	2,000
Total	..	2,800	2,800
Grand Total	..	7,600	2,000

On the piece of paper mentioning these requirements is an endorsement by the Executive Engineer which merely says:—

“ S. D. O., Thanesar, has been asked to buy it locally.”

This Sub-Divisional Officer (Shri Santokh Singh) went to Doraha on the 30th August, 1953, and purchased 3,950 sleepers there from Messers K. C. Bhalla and Co. On his return, he made a report to the Executive Engineer which runs as follows:—

“ I have examined the timber market at Doraha. The prevailing market rates of good quality of selected timber in Doraha are given below. The selection of timber has been made from stocks and the rejection 16 per cent to 25 per cent. Only specified sizes have been selected.”

Kind of wood	Forest Depot schedule rates	Extra for size selected	Total forest rates per c. ft.	Negotiated prevailing market rate with selection 15 per cent to 25 per cent
	Rs		Rs	Rs
1. Deodar wood 10' × 10" × 5"	5	per c. ft. 25 per cent	6/4/-	5/12/-
2. Kail wood 10' × 10" × 5" 4	„	25 „	5	4/12/-
3. Chil wood 12' × 10" × 5" 3/8/-	„	25 „	4/6/-	4/12/-

14.21. This report, it will be noticed, makes no mention of the precise number of sleepers that had been bought. It is at best an intimation of the fact that some timber has been selected without giving any idea of the actual quantities involved. On this vague report, the Executive Engineer put an endorsement, dated the 10th September, 1953, as follows:—

“Forwarded to the S. E., Narwana Circle, for approval please. The case has been personally discussed with him by the undersigned.”

Again, it is not mentioned that any wood had actually been purchased nor the number of sleepers. The Superintending Engineer returned this communication to the Executive Engineer on the same day, i.e., the 10th September, 1953, and said,

“I am unable to entertain this unofficial reference. It should be an official letter by the Executive Engineer and contain what is required. The responsibility of calling quotations or tenders is that of the Executive Engineer and not of the Sub-Divisional Officer. It is not necessary to pass on the information supplied to you by your Sub-Divisional Officer.”

14.22. The Executive Engineer kept quiet over this matter for nearly three months. In the meantime, an interesting development had occurred. A letter was received, dated the 12th September, 1953, from Messrs Shamsher Chand Kuthiala addressed to the Superintending Engineer complaining that the Sub-Divisional Officer had gone to Doraha early in September, and had collected some quotations and had purchased some timber from different retailers; but that their own quotations which were competitive had been ignored, that they had good stock of all kind of timber required by the Department and since more timber was likely to be required they should be allowed to quote for it. This letter was sent by the Superintending Engineer to the Executive Engineer for report; but no report was ever made. A second letter of protest on the same lines was received from another firm R. B. Jodha Mal Kuthiala and Company, dated the 14th September, 1953. This again, was sent by the Superintending Engineer to the Executive Engineer with a direction to take such action as he considered fit and report compliance. Again no action seems to have been taken. It was in the beginning of the year, 1954, that the Executive Engineer repeated his proposal for approval of the rates at which the timber had been bought already in September, 1953, and it was then stated by him that Shri Santokh Singh had been sent to buy timber in the open market at Doraha, that he had purchased 3,950 sleepers valued at Rs 65,086-11-0 and that the rates were the lowest that could be obtained in the market and the rates were otherwise reasonable and the timber was urgently required and also that the rates had been verbally approved by the Superintending Engineer. This recommendation remained lying with the Superintending Engineer for another three months and it was accorded sanction on the 12th of April, 1954. The Superintending Engineer says about this sanction that he had no idea at that time that he was then giving sanction to the timber purchased in September, 1953. In pursuance of the sanction actually accorded on 26th of October, 1953, 2,400 sleepers were purchased from four different firms.

In the meantime, in respect of the first purchase there had been some confusion about 100 sleepers. It was thought at one time that the sleepers bought were only 3,850 in number, but the contractors insisted that they had sold 3,950 sleepers and ultimately the contractors were paid for these 100 sleepers also, and to cover this, a supplementary sanction for the purchase of 100 sleepers was obtained from the Superintending Engineer in August, 1954.

14.23. There was a fourth purchase of 3,232 sleepers and that was in pursuance of the Superintending Engineer's sanction, dated the 26th February, 1954.

14.24. It would thus appear that the total requirements were originally stated to be 7,600 sleepers, while sanction from the competent authority was obtained for the purchase of 11,732 sleepers and actually 9,487 sleepers were bought. In order to gauge the quantity purchased in excess of the requirement, we obtained figures from the Sub-Divisions showing the receipts of timber in cubic feet in each Sub-Division and the issue of timber up to the time of the close of construction and we found that in the three Sub-Divisions the total receipts were 1,10,460 c. ft. of timber and the total issues 88,612 c. ft., and the balance of 21,848 c.ft. remained lying in stock without having been ever used. In other words *about 6,250 sleepers were never put to any use.* Their approximate cost comes to Rs 75,000. The purchases made show very little planning and it is clear that a considerable quantity of timber was never needed and was bought; because the requirements were not properly ascertained.

14.25. Apart from this matter of excessive purchase, there is the question of the rates paid for the first purchase of 3,950 sleepers. We have already mentioned that two timber merchants, one of whom R. B. Jodha Mal Kuthiala and Company, is one of the biggest timber merchants in the State, complained at the very time and alleged that the purchase from Messrs. K. C. Bhalla and Company has been made as the result 'of a prior understanding'. We have compared the rates paid for deodar, kail and chil subsequently, and we find that the rates paid in September, 1953, were substantially higher. We also find that lower rates were offered and that

timber at low rate was available. Thus, for size of the deodar sleepers $10' \times 10'' \times 5''$, the rate paid was Rs 5-12-0 per c. ft., while shortly afterwards a rate of Rs 5 was offered, and we have no reason to think that deodar sleepers could not have been purchased at that rate earlier. For kail sleepers, the rate prevailing in the market appears to have been Rs 3-12-0 as against Rs 4-12-0 a c. ft. actually paid. Similarly, about chil, a rate of Rs 3 if not a lower rate, was perfectly feasible ; while Rs 4-2-0 per c. ft. has been paid. *The excessive price thus paid on this transaction works out to Rs 28,000.* The manner in which this purchase was made, the simultaneous complaints received in connection with it, and the belated sanctions accorded by the Superintending Engineer all point to the conclusion that undue favour had been shown to the suppliers and more than reasonable price paid.

14.26. For the II Bhakra Main Line Circle, we got a statement (*vide* annexure 13, appendix I) prepared in respect of seven items of material, namely, cement, bricks, tiles, surkhi, kankar lime, slack coal and steel. This statement shows the receipts, the issues, and the closing balances each year, beginning with the financial year 1951-52, and ending with the financial year 1955-56. It appears generally from this statement, that large stocks were built up during the year 1953-54 and in spite of this, receipts continued during the year 1954-55, which could not be used up and at the end of the year 1955-56, fairly heavy balances were left over. The total value of the seven items of material in stock at the end of March, 1956, comes to Rs 21,22,000. Of this, however, stock of steel, bricks and tiles, accounts for Rs 13,50,000 and as these materials do not deteriorate readily and can be used when required and bricks and tiles are certainly likely to be required for repair work, we are not inclined to make any comment. There are, however, two items, namely, surkhi and slack coal, which require consideration.

14.27. The supply of surkhi commenced in 1952-53 which left a balance of 4,62,000 c. ft. at the end of 1953-54, which means the close of March, 1954. Some surkhi, however, appears to have been used during the year 1954-55, and more surkhi was purchased during that year, the closing balance in March, 1955, being 3.19 lac c. ft. During the next year 1955-56, not much surkhi was used and the closing balance in March, 1956, was 3.04 lac c. ft. There does not appear to have been any need for obtaining fresh supplies of surkhi during 1954-55 and the purchases actually made do not seem justified. The value of the balance of surkhi left in stock in March, 1956, comes to Rs 1,50,000, and there does not seem much possibility of using this profitably and with passage of time, this material will deteriorate and otherwise lost and we do not think we will be wrong in estimating *the net loss due to this over-accumulation as in the neighbourhood of Rs 25,000.*

14.28. A large stock of slack coal appears to have built up during the year 1953-54 and the closing balance at the end of March, 1954, was 25,000 tons. By that time, the tiles required for lining had been manufactured and so also the bulk of the bricks. During the two following years, 1954-55 and 1955-56, the total issues for slack coal come to only 2,753 tons and 999 tons, respectively, and some supplies were also received, namely, 280 tons in 1954-55, and 72 tons during 1955-56. The result was that at the end of 1955-56 the stock balance of 15,632 tons was left on hand. The value of this quantity of coal is about Rs 4,50,000. It is quite clear that much more coal than could possibly be used was purchased during the year 1953-54 and having remained in stock for over two years, a good part of this coal must have deteriorated and we have no doubt that, on disposal, considerable loss will have been incurred, somewhat similar to a loss in the other circle, apart from the fact that Rs 4,50,000 were unnecessarily locked up in this manner for over two years. If we adopt the basis indicated by the loss incurred on the disposal of slack coal in the 1st Bhakra Main Line Circle, *the total loss would come to Rs 2 lakhs.*

14.29. We have already referred to the over accumulation of cement due to erratic supplies in disregard of actual commitments for the manufacture of kankar lime. One consequence of these large supplies of cement appears to have been that large consignments of cement were left lying at Jakhal Railway Station during February to April, 1954 and huge sums of money had to be paid to the Railway as wharfage charges. Surprising as it may seem, in one month, i. e., April, 1954, huge sums of money had to be paid to the Railway as wharfage charges. Surprising as it may seem, in one month, i. e. April, 1954, over Rs 60,000 was paid as wharfage. Some of this amount has been agreed to be refunded by the Railway, but we gather from the figures supplied to us by the Tohana Division that a sum of Rs 21,132 has had to be paid to the Railway as wharfage charges ; because several consignments of cement were left lying at Jakhal Railway Station for a period ranging over two to three months. When we enquired into the reasons for this extraordinary delay in removing perishable material from the railway premises, we were told that the season was rainy, the roads were not in order and the Ghaggar was not crossable at R.D. 64,000 and further that godowns were not available at Jakhal, while the supply of cement was in excess of the requirements. We cannot believe that at that time of the year it was continuously rainy at Jakhal for two to three months and we are inclined to think that these consignments were left at the railway station, because proper arrangements had not been made for storing the cement. Apart from the wharfage, we find that about 5,000 bags of cement lying at the railway station were damaged, thus causing a loss of about Rs 20,000. *The total loss that could well have been avoided if everything had been carefully planned comes to Rs 40,000.*

14.30. We looked into the purchases of spare parts which appear to have been in considerable quantity in two of the divisions in the II Bhakra

Purchase of spare parts in excess of requirements.

Main Line Circle i. e., Tohana and Sirsa. These spare parts were required mostly for the transport trucks in use and the tractors and pumps. It appears that between 1951 and 1955 spare parts worth Rs 5,12,000 were purchased in the Sirsa Division and in the Tohana Division, spare parts worth Rs 5,58,000 were purchased between 1951 and 1956. Most of these purchases are actually concentrated in three financial years 1952-53, 1953-54 and 1954-55. To ascertain whether these parts were really required and what happened to those parts which the new parts had replaced, we found that no accounts of the old parts had ever been kept and it was not clear how they had been disposed of except that presumably they were thrown away. The Rules require that such old parts must be effectively destroyed. To judge the actual need for all the spare parts that they had bought, we scrutinised several lists pertaining to several years and finally obtained figures for the stock of spare parts held in these two divisions at the end of the construction period. It transpires that even in August, 1956, large stocks of spare parts were being held in these two divisions, their value being in the Tohana Division as Rs 1,84,000 and Sirsa Division, as Rs 1,79,000. It is clear that spare parts in very large numbers of the total value of Rs 3,63,000 have never been put to any use and obviously were never required and need not have been bought, if care had been taken in assessing the real need for such parts. We have compared the quantity of spare parts purchased with the number of trucks, pumps and tractors that were working in the division. This comparison also conveys the impression that the spare parts much in excess of the need were purchased.

14.31. Some of the spare parts were purchased from accredited agents of the manufacturers; while some others appear to have been bought

Purchase procedure.

locally and although it is said that in nearly all cases quotations were actually obtained and the lowest quotations generally accepted, we were unable to find any such quotations in respect of purchases of the value of Rs 27,000 in the case of the Tohana Division and Rs 29,000 in the case of the Sirsa Division. This is apart from those purchases in which the value of individual transactions did not exceed Rs 1,000 in which case the rules did not require the calling of quotations. Our general conclusion is that substantial amounts of money were allowed to be locked up in unnecessary spare parts. We are not sure if the surplus stock now in hand will be properly utilised; as it is not unlikely that with new models of machines, these spare parts may not become obsolete.

CHAPTER XV

CONCLUSIONS AND RECOMMENDATIONS

15.1. We can now sum up. The total works expenditure on the Nangal Hydel Channel and the Bhakra Canals including the Bist Doab Canal is reported as Rs 3,807 lakhs. We have ourselves examined works costing nearly Rs 900 lakhs. The excesses which we have discussed come to Rs 50 lakhs. These excesses are, of course, illustrative and not exhaustive. As we have already mentioned in para 6.2, it would not be safe to generalise further. The bulk of the excess expenditure concerns earthwork, but apart from that, there has been considerable abuse of the powers of local purchase and misinterpretation of the Schedule of Rates. Dishonesty and neglect have both contributed to these excesses, but since in their visible effect on expenditure, the two are identical, it has not always been easy to draw a line of distinction. There is little doubt, that individual officers have at times acted dishonestly, equally, no doubt, that opportunity for dishonesty was mostly afforded by the confusion occasioned by injudicious planning and insufficient supervision. None of these matters, however, need obscure the outstanding fact, that a great deal of hard honest work, a good deal of initiative and a great deal of courage have gone to make for the successful accomplishment of this big project.

15.2. In the forefront of our recommendations, we have placed the suggestion that a project of the kind we have been examining, requires more comprehensive and more careful planning than the Irrigation Department has apparently been accustomed to. It is, we think, necessary that such planning must be undertaken before any work on the project starts, and we have little doubt that the more carefully the work is planned, the less confusion there will be in the execution of it. We have noticed that insufficient planning has led to considerable leakage of expenditure during the present project and we would repeat that careful planning of details is all important and must, in future, receive undivided attention.

15.3. Linked with planning and quite as important is the necessity of procuring adequate personnel to man a project—adequate both in numbers and quality. The bulk of the construction work is in the hands of Sub-Divisional Officers and efficiency at that level would appear to be a prerequisite of success and it seems, therefore, necessary that suitably experienced Sub-Divisional Officers should be made available. When, therefore, a new project is in sight and expansion of personnel in the department is anticipated, steps should be taken to ensure that fresh recruitment is made sufficiently well in advance to enable the new entrants to gain experience; not only of engineering methods, but also of departmental practices. It is not wise policy to recruit raw hands just in time to place them in responsible positions, as appears to have been done in the case of this project, where a large number of young engineers fresh from colleges, had to be put almost directly in charge of Sub-Divisions and within a few years in charge of Divisions, and even a large number of inexperienced overseers in charge of sections. When in 1919, the Sutlej Dam Project was submitted to Government, the Superintending Engineer forwarding it, made a clear cut assertion :—

“If there is any prospect of this gigantic scheme being sanctioned in the course of the next two or three years, it is essential and indispensable that Government should look ahead and get its own officers now at once so that they could be trained and be able, by the time work starts, to take their places as efficient officers, either on the new canals or take

the place of men from existing canals. This is a most important matter and I urge its consideration on Government."

15.4. Such, we believe, would be the right approach to this question and we regret to find that although the present project was much bigger than the project of 1919, firm steps were not taken to recruit and train young engineers in time, and there seems to have been a certain amount of shyness about proposing an expansion of the personnel until such expansion was forced by events. We are not at all sure, if the old method of relating the cost of establishment to the total cost of works is wholly valid under present day conditions and we believe that a properly manned project, although showing a higher percentage of establishment charges, would ultimately prove less expansive, than an understaffed project leading to confusion.

15.5. There is then, the other staff employed in the Irrigation Department and, in particular, the accounts staff. One fact that has helped to earn for the department a bad name, has been the heavy arrears in accounts and this has led to a controversy both unpleasant and unnecessary. Some of the engineers, quite responsible otherwise, have been inclined to brush aside the fact of these large arrears as of no consequence, and some others have treated the advice tendered by the auditors as of no importance. We are quite clear in our minds that the keeping of up-to-date accounts is absolutely essential, and if this can be done only by the employment of more staff or more experienced staff, the fact of extra cost ought not to weigh at all. We say this, because, any delay in the compiling of accounts leads to confusion and it is confusion that affords opportunity for dishonesty. We can otherwise find nothing inherent in the nature of accounts, to justify the suggestion that accounts cannot keep pace with the works.

Up-to-date and correct accounts vital for control of expenditure.

15.6. The preliminary record, on which all accounts are based, is prepared by the Overseer and is contained in the measurement books. The next document prepared is the contractor's bill. It is admitted that there is never any delay in the writing up of the measurement book because there has to be no delay in the preparation of the contractor's bill. It is, in fact, the pride of the Irrigation Department that their contractors are paid promptly, which enables even contractors with small resources to undertake work. The delay, therefore, occurs subsequent to the preparation and the payment of the bill. The rules require the compilation of a number of documents with the help of the basic records and it is these documents that are not prepared in time. The accounts are later compiled in the Division and delays have occurred in the compilation of accounts there, because some of the essential records were not ready. Considering the volume of work that the preparation of these documents involves, we are surprised to find that the overseer has no clerical assistance of any kind at all. We have discovered that quite frequently, an intelligent overseer uses one or other of the work-charged establishment as a clerk to help him. It is, we think, time that official recognition to this practice was given and the Overseer provided with some clerical assistance.

Clerical assistance for overseers necessary.

15.7. In the Sub-Division, there is usually one single Sub-Divisional Clerk and only during construction has he an assistant to help him. Considering that accounts really start in the Sub-Division, the staff seems hardly adequate and we would suggest that the question of more assistance at this level be seriously considered when any new project is started.

Divisional and Sub-divisional offices—More clerical assistance necessary.

15.8. In the Division too, we think, there is room for increase in the number of Accounts Clerks during construction. A suggestion for expansion of this cadre was made by a Committee of Engineers in 1952, but was substantially turned down by the Finance Department for fear of its large implications. One result has been, that a huge arrears staff has had to be employed for clearing the arrears and so far as we can see, there is very little prospect of this work being completed in the near future, although three years have passed since major construction work was over. The volume and nature of these arrears can be gathered from the statements in Annexure 14, Appendix I. As the Chief Accounts Officer (Shri Ishwar Dayal) stated before us :—

“It would have been better to have entertained more staff at the time of the project rather than entertain these arrears divisions”.

Even more marked than deficiency in numbers, has been deficiency in experience. The Chief Accounts Officer very frankly admitted this and said :—

“I agree that on the Accounts side, during the present project the accounts staff was not equipped with the same experience and training as in pre-partition days. There has been a general lowering of the standards in the accounts branch like other branches of the administration, the reasons being sudden expansion”.

Here again, we think, the remedy lies in anticipating the need for expansion ahead of time so that the new staff can gain some experience before being allowed to handle responsible work.

15.9. Having said all this, we would like to repeat that unless responsible engineers appreciate the need of up-to-date accounts, the whole purpose of which is to provide them with an instrument to check the expenditure as it is being incurred, no real improvement can be expected. We do not, of course, mean that every engineer on the project had adopted the attitude that keeping of accounts was the concern of somebody else, but when we find that the Chief Engineer, Bhakra Canals, at the crucial time (Shri R.R. Handa), had sharply pronounced views on this matter, we suspect that the attitude of the officers serving under him may have been affected by those views. When examined by us, Shri R.R. Handa said :—

Attitude towards accounts—
change required.

“I am aware that accounts concerning the Bhakra Canals Administration have not been completed. I did not expect that the accounts would be kept entirely up to date, because I knew from past experience of construction work that all construction accounts always lag behind the works”, and later on;

“Regarding the delay in accounts, it is, I think, impossible to keep the accounts up to date with staff as it is. There is only the Sub-Divisional Clerk in a Sub-Division, normally, and during construction, he is given an Assistant, but that assistant is usually inexperienced. If it were possible to employ a sufficient number of experienced Accounts Clerks, it may perhaps be possible to keep the accounts up to date, but it will never be possible to find sufficient number of experienced clerks due to cadres fixed by Government for economical working of canals.”

Further elucidating this point, he said :—

“ I would here warn that backwardness of accounts should not reflect on the Sub-Divisional Officers, Executive Engineers, and Superintending Engineers ; because otherwise, accounts and clerical establishment can slow down accounts to bring bad name to them and the result will be that labour strength will drop and progress on works slow down. Past practice should be followed when arrears establishment were always employed for sometime to complete the accounts. ”

It will be seen that Shri Handa appears to have thought that Irrigation Officers were concerned merely with construction which they should accomplish as rapidly as possible, while the rendering of accounts of expenditure incurred by them was the responsibility of the accounts staff. We need hardly say that this is not so. The duty of keeping and rendering accounts lies exactly where the power of spending it rests, and since the cheque books are with the Irrigation officers, the responsibility of rendering prompt and faithful account of all sums drawn by keeping a continuous record of expenditure as required by the rules, is theirs and any default in this respect seems to us a far more serious matter than a small delay in the works. The existing rules of this Department appear adequate to ensure maintenance of up-to-date accounts and we can only add that the rules must be observed.

15.10. In the Stores Organisation—both in respect of the purchase of stores and their custody—there is considerable room for improvement.

Procurement and custody of stores—Central agency suggested.

There was, during the present project, a Procurement and Focal Officer for the centralised purchase of certain stores, but that officer mainly procured such items as machinery, steel, cement and coal. Other items of considerable value, like timber, pipes, spare parts and even small machinery like, pumps were locally purchased from time to time in the various circles. There was no standardization of these items nor were any specifications prescribed for the guidance of the officers and each officer appears to have bought either what was readily available or what he personally considered suitable. These purchases resulted in different rates and some of these rates were much in excess of the market.

15.11. Custody of stores was mostly with overseers although at times separate store keepers were employed. Many of them were not familiar with all the items of stores, particularly mechanical stores. There was no uniform method for the housing of these stores, and while temporary godowns were sometimes constructed ; at other times godowns were hired for the purpose. We saw some of these stores and noticed that the arrangements for the custody of stores like cement and kankar lime were not satisfactory and we know that in some of the hired godowns, a good deal of damage actually occurred to cement. At one time, there was not sufficient space available for the storing of cement in one Division, and a large quantity of cement was left lying at a Railway station for nearly three months and a good part of it got damaged.

15.12. Regarding the issue of stores there was at places considerable confusion and although the departmental rules require that no stores should be issued without a regular indent on a proper form, it seems to have frequently happened that stores were issued on rough chits some of which have since been repudiated by their authors. Verification of stores, i.e., the tallying of ground balances with the book balances did not proceed with the regularity that the rules demand and belated verifications revealed large discrepancies, and stores of considerable value have been placed under miscellaneous advances against overseers and storekeepers pending dilatory investigations. The value of the items so debited to these low-paid officials is frightening. The total value of such miscellaneous advances against subordinates comes to Rs 8 lakhs as on February, 1957. Looking into individual cases, we discovered that as large sums as Rs 1,37,000 is shown against one single overseer, Shri Mohan Lal, in Tohana Division.

The hope, we understand, is that these advances will finally be adjusted, in the sense that the stores will be finally accounted for ; but if that does not happen, there is practically no prospect of making recoveries from the subordinates against whom the various amounts are outstanding. In the same connection, we have noticed that inter-divisional transfers of stores have not been fully accounted for and large sums of money are lying in suspense account, awaiting proper adjustment. The system seems to have suited a time when items of stores were a few and transactions concerning them not many. Modern-day conditions during the execution of a big project are somewhat different. We are aware of the dangers of overcentralization ; but we feel that in the case of a large project, involving valuable stores, a distinct advantage is to be gained by centralising the agency for the purchase and custody of stores. Such an agency would have a better bargaining power and would be able to obtain economical rates. It would also be possible then, to standardize most of the items to be used over the entire project, to make proper arrangements for the actual custody of stores and to provide suitable facilities for repairs to machinery and replacement of parts, as and when required. Further it will be possible for such an agency to employ wholtime storekeepers properly trained in the method of keeping stores and maintaining records concerning their receipts and issues and being independent of the local executive officer, such agency would be able to insist on the observance of the rule that no item be issued from a store without a proper indent. We are aware that the setting up of such an agency would involve some extra cost ; but considering the overall economy that should be possible with such a system, and considering that the prices of stores used on a project are continuously rising, it would, we feel, be in the interest of efficiency to employ such an agency. It is our impression that only by setting up a centralised stores agency during a big project, would it be possible to employ up-to-date methods of store-keeping and engage suitably trained store-keepers for the purpose. Our suggestion, of course, does not exclude the necessity of some purchases being made locally as we know that a certain amount of local buying would always be necessary, and our intention simply is to eliminate wholesale and indiscriminate local purchases, some instances of which we have previously mentioned.

15.13. We had long discussions with senior officers about the method of work employed in the Irrigation Department and we found that all were Methods of execution. so wholly wedded to the work order system that some of them were at times unwilling to consider the merits of any alternative method ; but since we are aware that in other parts of the country, other methods are being employed, it is useful to consider those methods on their merits. Speaking broadly, there are three methods in which any piece of work can be executed.

15.14. The first is to purchase the material required in the open market and hire the necessary labour on the basis of daily wages and get the work done under direct departmental supervision. Such a method affords the maximum possible experience to the engineering staff ; but at the same time, demands continuous and on-the-spot supervision by them. Where a large number of manual labourers have to be employed over a scattered area, there is almost insuperable difficulty of persuading such labourers to work to a required pitch and every one is, therefore, agreed that for the construction of canals, such a method is not suitable.

Direct Departmental agency—
not suitable for canals.

15.15. Secondly, it is possible to execute a piece of work by the employment of labour through a contractor to be paid on the piece-work system. The irrigation officers actually employ this method, but they do so with the proviso, that the contractor is under no obligation to execute any quantity of work or to execute it within a specified time. A rate for an item of work is specified, and the contractor is free to do as much of it as he likes. The rate specified, however, is not

Work order system—
through rates favoured.

for a finished item of work, but is further split up into several components and different rates are specified for these. Thus, in the case of R.C.C. work, there is a separate rate for bending the bars and placing them in position, a separate rate for shuttering and centering and a separate rate for laying the concrete and so on. The contractor merely provides the labour required for those various processes, that ultimately result in the finished work. This method of splitting up or itemising the job places some unnecessary strain on the supervisory capacity of the department and most engineers are now beginning to realise that nothing much is gained by this constant splitting up of items and that it is much simpler and much less irksome to obtain a through rate for a finished item of work. This method of 'Through Rate' has been tried at places even during the present project and we understand that it has resulted in smoother working and less onerous burden on the staff. We, in the circumstance, recommend the adoption of the method of 'Through Rates' even where otherwise, the work order system is employed.

15.16. Coming down to the essence of the work order system, which distinguishes it from what is called a firm codal contract, the difference lies in the fact that there is no limit prescribed, either in respect of quantity or in respect of time. In support of this method of work, three advantages are claimed :—

- (1) that it affords good opportunity to the engineers to gain first-hand experience of construction work by directly understanding the difficulties involved in each case, and by continuously organising the job themselves ;
- (2) that it enables the department to employ small contractors of labour who have not much overhead expenses to meet and are, therefore, prepared to work for small profits which leads to a reduction in cost ;
- (3) that it assures an element of elasticity and leaves the door open for the elimination of a lazy contractor at every stage. It is said in this connection that the nature of irrigation works is such that, their completion within a particular period of time is absolutely necessary, and this can be assured only if the department has the option of replacing, in time, a contractor showing inadequate progress by a better one.

15.17. The third method of work is, of course, the firm contract system under which a contractor is engaged to execute a specified quantity of work at certain rates within a certain time. The Codal contract. advantage here is that the degree of departmental supervision is considerably reduced and if the contractor is reliable, the constant anxiety of watching the progress of work is avoided. It is provided in such contracts that if the work does not progress according to the agreed programme the contractor would be liable to penalties and it is understood that the threat of penalty keeps the contractor abreast of the work. The irrigation officers say that such a firm contract with a lazy contractor might at times land them into serious trouble and the overall loss caused by an unfinished work within time, may be considerably more than can be compensated by the penalties stipulated in the contract. Further, it is urged that if the contractor has to bind himself to such penalties, he will necessarily safeguard himself by raising his rates, and in the result, the cost of work as a whole will go up. Also, it is argued that only a big contractor with a big organisation will be able to undertake the work under such conditions and his overhead expenses will demand higher rates.

15.18. We have considered all these factors. Had our interest in this matter been academic, we could have marshalled enough argument to show that all the merits do not lie with the work order system. Our interest, however, is practical. We know that no system, however, good, can work unless the will to work it, is present and our discussions with the irrigation officers, leave no doubt in our mind that at the present stage, there is little desire for a changeover from a familiar to a somewhat unfamiliar method of work. We are not, therefore, suggesting the abandonment of the work order system. We would, however, recommend that it may be restricted to works of certain values beyond which the system of codal contracts should be adopted.

Work Order System to be restricted to certain values and codal contracts above.

15.19. In respect of the works let out on the work order system the Executive Engineer has full powers for accepting tenders, provided the lowest tender is accepted. For Codal Contract, however, his powers are limited and so are his powers for sanctioning estimates. The situation strikes us as somewhat anomalous, and we would suggest that some limit should be placed on the powers of the Executive Engineer in accepting tenders, even where the work is to be done under a 'Work Order'. Works of larger value can then receive maturer consideration by more senior officers as is intended in the case of Codal Contracts. We might also add that the practice of negotiating a rate with a contractor, after tenders have been received, is liable to abuse and must be discouraged.

Acceptance of Work Orders Executive Engineer's powers to be restricted.

15.20. When we were checking the quantities of earthwork, we came across the difficulty that the various measurements concerning even a single reach were not to be found at one place ; but were scattered over various measurement books, the reason being that these measurement books are small in size and are required to be written up continuously so that whatever an overseer happens to measure from day to day, is recorded in that order without regard to the continuity of subject. At Harike, however, we saw that in connection with the earthwork for the Ferozepur Feeder, large sized measurement books, had been used and in those large measurement books, pages had previously been reserved for specified reaches, the result being that measurements concerning a particular reach could be found at one place and therefore, readily checked. Somehow, the use of these large sized measurement books was mostly discontinued during the present project. We were told that there is danger of subsequent interpolation where separate pages are reserved for separate reaches, but we think that the advantage to be gained by continuous record of earthwork concerning a particular reach is so much, that the danger of dishonest interpolation subsequent to the work can be disregarded. We think, in the circumstances, that large measurement books for recording earthwork measurements can be profitably employed with reservation of pages for individual reaches or works.

Large Measurement Books with pages reserved for reaches advocated.

15.21. The rules require that the Sub-Divisional Officer should himself measure a part of the work measured previously by the overseer, that being 35 per cent of the value. This is both wooden and vague. The point of a proper check is that every important item is scrutinised and the requirement of percentage in terms of value does not ensure this. It would be better if the nature of the work required to be check-measured by the Sub-Divisional Officer is prescribed. For instance, it need not be necessary for the Sub-Divisional Officer, to check-measure such of the work as can be checked at any late stage, while on the other hand, such work as cannot subsequently be checked at all, ought to be check-measured in bulk, as quickly after the overseer's measurement as possible. Earthwork generally and foundation work particularly, would seem to fall under

Sub-Divisional Officer's check—measurement to extend to all important items of work instead of to a percentage of value.

the latter category and we think it would provide a better check if emphasis were laid on the necessity of checking a larger portion of such work as is possible and we would, therefore, suggest that the Chief Engineers might well consider the advisability of revising the rule. It does not seem necessary to us that the check-measurements by Sub-Divisional Officers should be entered in separate books as is being done now and it would be better if he is required to record his check of the overseer's measurements in the original measurement book of the overseer.

15.22. We have heard it said repeatedly, that since the Partition there has been a general fall of standards in the Irrigation Department.

**Temporary Engineers—
future to be defined.**

It is said that discipline is not what it used to be or what it should be ; that the sense of integrity that was previously associated with officers on the top has tended to decrease ; that corruption that was confined to certain levels has gradually crept higher ; and that efficiency, in general, has declined. A detailed investigation of these matters is largely outside our terms of reference ; but since the matter of efficiency is intimately linked with the question of economy, we have considered this aspect. One general cause for this state of affairs is to be found in the too sudden expansion of the department necessitated by the present project. This has taken the form of a large number of temporary engineers. The future of these officers is uncertain and their terms of service somewhat insecure. These conditions are not conducive either to good discipline or to hard work. We know that temporary engineers were even previously employed in the department, but it was always understood on previous occasions that none of the temporary Engineers would be discharged, except for misbehaviour, while the present cadre of temporary Engineers has no such assurance. In fairness to these officers, and to the department, it is, we think, imperative that Government should decide as soon as practicable what proportion of these officers will be possible to absorb in the permanent cadre and in respect of the rest to settle the conditions of their service, so that every one knows how he stands. We have adverted to this matter as we find that there is a general sense of grievance pervading the whole class of temporary Engineers at the present time, which it seems to us wise to dispel as quickly as possible. It should not be difficult to look ahead and determine the conditions of service for the temporary cadre and thus set at rest their natural apprehensions. We are thinking of future projects likely to be undertaken by the State.

15.23. The lowest paid technical officer in the department is the Overseer. His starting salary is Rs 100 per month in a grade of Rs 100—8—

**Overseer's emoluments—
increase suggested.**

140/10--160/10--230/10--300. Before employment he is required to possess certain technical qualifications which is expensive. During employment, he is hard-worked particularly during construction. We have been told that most of these Overseers, like other low-paid staff in other departments, supplement their legitimate income from other sources. This is the core of the traditional corruption in the irrigation department and if it is intended to eradicate this, it appears to us necessary to make a suitable increase in their emoluments which at present seem inadequate.

15.24. The departmental set up, also requires consideration. We would like to mention here that the Irrigation Department is important and

All-India Service of Engineers—Revival Suggested.

its importance is likely to grow for some time yet. The work it does, is valuable not only for the State but for the whole country. Prior to 1931, there was an Indian Service of Engineers, which furnished officers for the superior posts in the department, and we think it would be helpful if an All-India Service is again constituted, as that would help to raise the standard to some extent and what is more, that it will make for better mobility of talent, particularly specialised talent, throughout the country. We learn that the Central Government is considering such a proposal with sympathy and we would suggest that the State Government should lend its full support to such a proposal.

15.25. The ultimate responsibility for the efficiency of the department, rests on the Chief Engineers and since there are more than one of them somewhat independent of one another, it largely rests on the degree of co-operation among them. A suggestion has been made that a single Chief Engineer in charge of the department assisted by a suitable number of additional Chief Engineers might be a better alternative. We have been assured, however, that the present system has worked well enough, since a fairly long time and in view of the past experience, we are not proposing any change.

Co-ordination of Chief Engineers.

15.26. The Chief Engineers deal with Government through a non-technical Secretary who is in charge of the Department. This innovation is quite recent having been made only since November, 1956. We do not exactly know, how well the new system has worked in practice, and although the Chief Engineers have expressed certain views on the actual working of the new system, we are not sure if those views are entirely free from bias and would not, therefore, like to found any conclusion on those views. We have, no doubt, that Government will soon be aware of the strength or weakness of the new system and should be able to make appropriate changes, if necessary. We can only suggest that should the experience of a non-technical Secretary not prove entirely happy, a technical Secretary to co-ordinate the policies of the Department might be tried.

Irrigation Department Secretaryship.

15.27. There is another direction in which a modification of the departmental set up is indicated. A major fact that is beginning to make its appearance in construction work, is the employment of machinery and it is probable that as time goes on more and more machinery will have to be employed. The employment of machinery necessitates the employment of personnel trained to handle such machinery. This process is likely to accelerate and in course of time, the mechanical engineers employed in this connection will look for promotion to the highest office within the department. It seems to us that the organisation as it is now, does not readily facilitate such promotion and it is in the circumstances, wise to look ahead and make appropriate modifications to accommodate the new trends. Connected with the same matter, is the question of other specialists like those employed in the Central Designs Office and in the Irrigation and Power Research Institute and we think, it is time that serious thought is given to this matter of providing a scope for the promotion of these officers to the highest grades without being required to deviate from their specialised fields.

Specialists—Provision for due promotion to higher grades.

15.28. About corruption we have had the frankest possible discussions with Irrigation Officers. The fact of some corruption in the Department is undeniable, the only thing stressed being that it is no worse than in any other department entrusted to spend large sums of money. Two facts have in this connection been brought to our pointed notice :—

Corruption and its Eradication—No promotion for men of doubtful integrity.

- (i) that suspicion of corruption has, since the Partition, begun to attach itself to very high officers ; and
- (ii) that considerations other than merit have begun to weigh in the promotion of officers, to higher posts.

Both these have a larger significance than may be readily appreciated and it is, we think, necessary that attention is paid to these matters. There is no ready-made remedy for corruption and the main hope lies in creating a climate of opinion wholly intolerant of corruption. It is obvious, however, that if verbal condemnation of corruption is accompanied by toleration of the corrupt by affording them promotions, there can be little hope for improvement. We would urge, therefore, quite unnecessarily we hope,

that, when promotion of individual officers is under consideration, particularly promotion to administrative posts, great weight should be given to the reputation, these officers may have earned. There is, we are happy to say, no dearth of officers in the department with unblemished reputation. We notice, that while within the department, almost everyone is aware of the reputation of every officer, the official records do not always reflect that fact. One reason, we find, is that periodic reports on the work and reputation of individual officers, which form the official record, have recently, become colourless and have thus ceased to be fully informative. The result is that Government which must necessarily act on recorded information, is quite often not in possession of the facts. We would urge that officers should be encouraged to express themselves more freely about the work and reputation of their subordinates so that Government may have the fullest benefit of their experience. We need hardly add that promotions in the department must be made on the basis of merit alone for, once other considerations are allowed to creep in, there is no sure method of arresting the process.

15.29. Discipline and efficiency are closely linked together and decline in discipline is bound to lead to some deterioration in efficiency.

Unquestionable integrity—
basis for filling highest
posts.

For maintaining good discipline it seems to us necessary that the officers on the top are always able to command unquestioned respect which is hardly possible, if suspicion of dishonesty, however unfounded it may be, attaches to those officers. It is, therefore, necessary to exercise the greatest possible care in the selection of the officers to fill the highest posts.

15.30. A certain amount of inefficiency in the irrigation offices is attributed to the fact that the staff employed is not now of the same calibre as it used to be. We have been told that

Offices of similar status
classification to be on par.

while formerly the Executive Engineer's office was at par with the office of the Deputy Commissioner of the District, there has since some time been an upgrading of the Deputy Commissioner's office; while the Executive Engineer's and the Superintending Engineer's offices have stayed in the lowest class. The result is that it is not possible to attract the same kind of staff. This is bound to reflect to some extent in the work of the officers themselves. We are not fully aware of all the implications of the change, but we would like to bring this matter to the notice of Government for such consideration as it may think proper to give to it.

15.31. Finally, we would like to suggest that departmental officers should have opportunity of coming together periodically to be able to appreciate and discuss their various practical difficulties and interchange ideas. This would make for smoother co-operation among the various officers and quickly bring to surface, problems which, in normal course, may take a long time to uncover. Such periodic meetings would help to foster that sense of moral solidarity among officers which is, in our opinion, useful to encourage. Such periodic conferences are being held in other States in the country and have proved helpful.

15.32. We have come to the end of our labours and there remains only the pleasant task of acknowledging the assistance we have received from various directions. We have first to mention

Acknowledgements.

our Secretary, Shri S. Raghavachari who bore the heavy burden of organising the staff and the difficult task of presenting to us in an orderly manner, the mass of information collected from numerous records. In particular, we are grateful for his selflessness in being persuaded to stay on with us at great personal inconvenience even when his domestic circumstances seemed to require his release from this assignment in February last. It was only his keen appreciation of our difficulties that finally led to his placing public duty in front of his personal convenience. We are also deeply indebted to our other staff, especially the engineering staff, for the hard work they ungrudgingly did throughout the enquiry.

15.33. The nature of our enquiry was likely to evoke some resentment; but we are happy to be able to say that throughout this period, we found no indication of such resentment on the part of the irrigation officers and from one and all, we have received ample co-operation. We would like to express our gratitude to the Chief Engineers, the irrigation officers and the other gentlemen who have helped us with their testimony, oral and written. We have also to thank those irrigation officers, too many to be named, who helped to make our stay in the various canal rest-houses as comfortable as anybody could have wished.

15.34. From the Chief Accounts Officer and his assistants in the various circles, we received very valuable assistance and equally valuable information which we would have otherwise taken a long time to collect. Similarly we got quite a lot of valuable data from the Deputy Accountant-General, Nangal. The Anti-Corruption Department, Punjab Government, gave us considerable assistance by drawing our attention to a number of specific cases apart from willingly helping us with records in their possession and occasionally lending us their staff. We are highly grateful to all of them.

(Sd.) S. S. DULAT, Chairman

(Sd.) P. C. AGRAWAL, Member

(Sd.) DILDAR HUSAIN, Member

S. RAGHAVACHARI,

Secretary, Bhakra Nangal High Powered Committee.

CHANDIGARH :

The 30th October, 1957.



SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

1. One major cause which led to the breakdown of the various controls in this Project is lack of adequate planning; hence, before any project of any appreciable size is undertaken, the authorities on the top must see that prior to starting of any work, a proper plan in all possible details is prepared and is placed in the hands of all subordinate officers responsible for its execution. (*vide* paras 3.16 and 15.2).

2. Another equally important factor is the planning of personnel and the absence of the same in the present project led to deficiency in number and of experienced personnel. It is, therefore, essential that the planning and procurement of sufficient personnel is made ahead of the project and arrangements made to train them, so that, by the time the work starts, they could take their place as efficient officers. (*vide* paras 3.16 and 15.3).

3. The Basic Schedule of Rates of the Irrigation Department is lacking in clarity in certain items. Besides, there is neither a supporting data book nor an up-to-date standard specifications book for reference. A careful review of the Schedule of Rates, so as to express the implications of the various items of work in unambiguous terms and provide realistic rates in the context of the present conditions, is imperative. The compilation of a standard data book and detailed standard specifications as adjuncts to the Schedule of Rates, is equally imperative. (*vide* para 4.13).

4. The field engineers resorted to the device of misclassification of earthwork in order to get at a workable rate within the frame-work of the schedule of rates, instead of adopting the straightforward method of getting the basic rates revised. Such a device led to serious abuse and should not be allowed. (*vide* para 5.4).

5. The rule of minimum 30 days' notice for the call of tenders, has not been followed in most cases. It is necessary to observe this rule in order to ensure competitive tenders. (*vide* para 8.14).

6. If the whole work had been planned and executed in an orderly manner, there is no need to pay rate higher than Rs 33 per thousand cubic feet, with the initial lead of 50 feet, even for the hardest type of excavation in the canals, and the payment made over and above this rate is attributable to ill planning and inefficiency. (*vide* para 13.10).

7. In view of the excuse that the basic rate for the earthwork is on the low side, it is difficult to assess the excess amount paid due to higher classification allowed, to get at a higher rate. But our general impression is that a too liberal upgrading of soil classification has been made in these canals. (*vide* para 3.11).

8. Once the volume of works and the order in which they are to be undertaken are settled, there should be no difficulty in deciding the quantities of various material required in the different periods and hence, it is essential that the detailed construction programme must be chalked out well in advance and the materials procured accordingly, in order to avoid accumulation, shortage of storage space and wastage. (*vide* para 14.1).

9. The maintenance of up-to-date and correct accounts is most essential for the control of expenditure and to ensure this, sufficient and experienced accounts staff has to be planned ahead. (*vide* para 15.5).

10. The Overseers have a lot of office work and should be given regular clerical assistance. (*vide* para 15.6).

11. The accounts staff in the Division and Sub-Division is not sufficient and should be augmented suitably. (*vide* para 15.7).

12. The attitude of Irrigation officers that accounts may lag behind, should change to one of active insistence of keeping accounts up-to-date (*vide* para 15.8).

13. A Central Agency for the procurement, custody and issue of stores is recommended, the local purchases being restricted to the very minimum. Such an agency will be able to standardise the items, have better bargaining power and obtain economical rates. (*vide* para 15.12.).

14. Such agency should have wholtime trained Store Keeper for proper maintenance of accounts. (*vide* para 15.12).

15. The 'Work Order' system may be restricted to work up to a certain value beyond which codal contracts should be adopted. Even for the work order, "Through Rates" system is suggested and Executive Engineer's powers for acceptance of tenders on work order basis should also be restricted to a certain value. (*vide* paras 15.15 and 15.18).

16. For facility of check, it is desirable to have large measurement books for earthwork and other large works and pages reserved for particular reaches of earthwork and works. (*vide* para 15.20).

17. The Sub-Divisional Officer's check measurements should extend to all important items of work specially those which cannot be checked at a later stage, such as foundation, reinforcements, etc., and not merely 35 per cent of the value of work paid for. The Sub-Divisional Officer need not record his check measurement in a separate check measurement book but instead record check of Overseers measurement in the original measurement book of the Overseer. (*vide* para 15.21).

18. In order to improve the efficiency, the conditions and status of temporary engineers should be clearly defined. (*vide* para 15.22).

19. The Overseers' emoluments appear inadequate and deserve to be increased. (*vide* para 15.23).

20. The revival of All-India Service of Engineers is favoured. (*vide* para 15.24).

21. If the present system of having a non-technical Secretary in the Irrigation Department does not prove satisfactory, a technical Secretary other than the Chief Engineer can be tried. (*vide* para 15.26).

22. Scope should be provided for specialists to rise to the highest grades in the department, without being required to leave their specialists' field. (*vide* para 15.27).

23. For eradication of corruption, when promotions to administrative posts are made, great care should be given to the reputation of the officers under consideration, as promotion of the corrupt would amount to toleration of corruption. (*vide* para 15.28).

24. The present confidential reports are colourless, giving no guidance to Government while considering promotions of officers. Hence reporting officers should be encouraged to express themselves more freely about the work and the reputation of the officers reported on. (*vide* para 15.28).

25. For promotion to the highest post in the Department, unquestionable integrity without any suspicion of dishonesty, should be the criterion. (*vide* para 15.29).

26. The offices of the Irrigation Department should be classified on par with those of similar status in other departments (*vide* para 15.30).

27. Periodical conferences of officers of the Department to discuss problems are recommended. (*vide* para 15.31).